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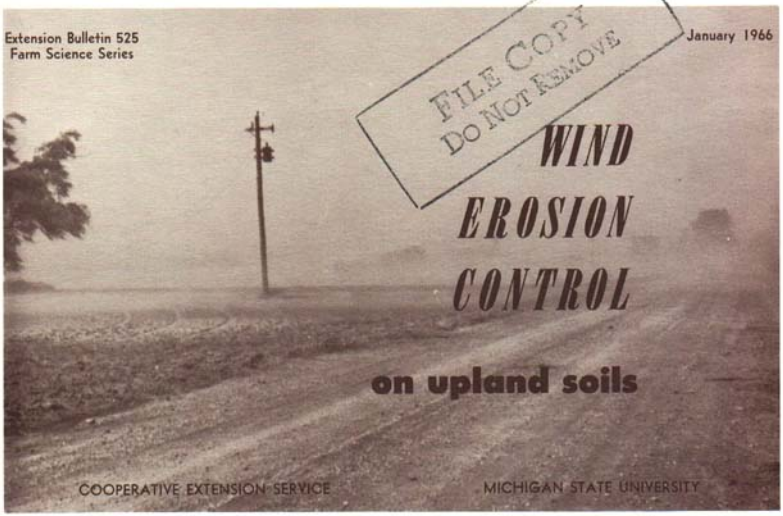

WIND EROSION CONTROL on upland soils

COOPERATIVE EXTENSION SERVICE MICHIGAN STATE UNIVERSITY

By Russell G. Hill*

Wind erosion control practices discussed in this bulletin are the following:

1. Plowing cross-wise to prevailing winds.
2. Row crops in north-south rows.
3. Strip Cropping
4. Minimum tillage
5. Plowing crop residues close to planting time
6. Cover crops
7. Fall-planted oats
8. Rye strips to protect row crops
9. Single sweep shovel on cultivator
10. Tree windbreaks
11. Permanent strips of vegetation
12. Maintaining good soil structure
13. Small grain drilled between row crops
14. Irrigation

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Wind Erosion Is Severe

Wind erosion on upland crop soils is occurring at an increasing degree in Michigan. Farmers on muck and sandy soil have been aware of wind erosion for many years and are using practices to control it. Farmers on heavier soils have only recently recognized wind damage as a serious soil conservation problem.

Major soil fertility is found in the top 8 to 12 inches of soil. Most of the organic matter, soil microbes, available plant nutrients, and soil aeration are located in this topsoil layer.

Every inch of soil lost by erosion amounts to approximately 175 tons per acre. Organic matter, clay and silt particles — the finest, most valuable part of topsoil — is most vulnerable to blowing. Such soil may contain 3 to 5 times as much plant nutrients as the land from which it blew. Wind acts like a fanning mill. It removes the fine and light materials, leaving the coarser, less productive material behind. This is not only the equivalent of several bags of fertilizer blowing away, but also soil particles which take many years for nature to replace.

Under continuous cropping systems, wind losses

John McGill photo

Without wind protection, these sugar beets on compacted soil had to be replanted.

John McGill photo

Minimum tillage plus rye strips help protect these sugar beets. Rye is cultivated out later.

John McGill photo

Oat strips are effectively used here to reduce wind damage.

You can't stop the wind, but you can reduce e the measures discussed here

may occur frequently on the same field. Soil losses from erosion are accelerated each year for a period of years as surface soil structure is gradually destroyed. Many fields of young growing crops are destroyed by wind erosion cutting off the plants or by covering them with soil. Crop yields may be greatly reduced.

Wind losses are often severe during winter. Some people talk about "winters of the black snow." This erosion is not as noticeable since immediate direct loss to a crop or seedling does not occur.

One of the most damaging effects of wind erosion is the filling of **drainage ditches.** This deposit not only costs money to remove, but farm drainage will be blocked until the deposit is removed. In the meantime, even further dollar losses result from lower production.

Wind Erosion Is Increasing

There are many reasons for increased wind erosion:

1. Lack of water. A wet topsoil will not blow, under ordinary conditions.
2. Intensive crop farming.
3. Reduced acreages of small grains, and grasses.
4. Larger fields under cultivation.
5. Removal of natural windbreaks — woods, fence rows.
6. Reduction in livestock (horses, dairy, etc.) therefore fewer acres in grass.
7. More efficient weed control and fewer plants in a row, especially sugar beets.
8. Fall plowing.
9. Unprotected soil over winter.
10. Longer vulnerable period due to early soil working and crop seeding.

Three Kinds Of Wind Erosion

1. Movement of soil by **saltation**

This is a bouncing movement where soil particles due to wind action bounce from 1 to 2 feet in the air and then back to hit the soil surface. This knocks other particles loose to bounce. This hammering effect is increased because each of these soil particles is spinning at the speed of 200 to 1,000 revolutions per second. When some obstruction is encountered, these bouncing particles are deposited on the ground and may appear as drifts.

2. Movement of soil in **suspension.**

This is the dust cloud. As bouncing soil particles hit the surface, small, fine pieces of organic matter, clay, and silt are knocked high into the air where the wind picks them up and carries them for many miles. These particles usually contain the most soil nutrients as well as organic matter.

3. Movement of soil by **surface creep.**

Larger grains of soil are too heavy to be bounced into the air but are pushed along the surface by the striking force of bouncing particles in saltation. These larger grains seldom get more than one or two inches off the surface. This is called surface creep. This creep of soil particles may be very rapid. It is responsible for the major part of cutting off or shredding surface vegetation and may also be deposited in ditches and fence rows.

The basic causes of wind erosion are few and simple. Wind erosion can be expected wherever the soil is finely divided and bare, the surface loose, smooth and dry, and the wind strong without obstruction. Erosion may be very slight wherever soil is made up of stable soil aggregates or clods large enough to resist the force of wind; where soil is covered by an umbrella of vegetation or residues; where the force of wind is intercepted; and where surface soil is roughened or kept moist.

Practices To Control Wind Erosion

A complete soil and water conservation plan would include the proper combination of practices for a particular farm. Effective wind erosion control practices on upland soils include those discussed in this bulletin.

1. Fields should be plowed and fitted in a north-south direction which is crosswise to prevailing winds.

2. Row crops such as beets and beans should be planted in rows running north and south. Ridges resulting from fitting and planting at right angles to prevailing winds will help cut down erosive action. The action of bouncing soil particles will be reduced by the ridges. Ridges up to 4 inches high running across the prevailing winds will help in reducing wind erosion. To be most effective, ridges 2 inches high should be 8 inches apart and ridges 4 inches high should be 16 inches apart.

3. Strip cropping is a very effective wind erosion control method. Alternate strips of cultivated crops, small grain and legumes or grasses are used. Each strip should be no more than 132 feet wide.

(Continued on page 5)

rosion with

John McGill photo

4 inch ridges across prevailing winds provided adequate protection to young plants.

SCS photo

Strip cropping across prevailing winds is one of the best erosion control practices.

SCS photo

Corn residue plus rye grass cover crop will give seven months wind protection to this large field.

SCS photo

Conifer windbreaks are one of the best long-time wind control practices.

H. J. Belter photo, Cooperative Extension Service, Berrien Co.

Four feet rye strips are protecting about twenty feet of melons. Nearby unprotected melons yielded 25 - 30 percent less.

Exact widths should be determined to fit planting and harvesting equipment. In some farm areas where legumes and grasses are not extensively grown and where wheat acreage per farm may be limited, it may be wise to use a narrow strip of wheat (approximately 36 feet) and a wider strip of cultivated crops (approximately 76 feet depending on width of planter.)

4. Minimum tillage not only retards erosion due to the rough surface but also saves time and equipment expense. Don't make a garden out of your seedbed.

5. Crop residues should be left on the soil surface or partially worked into the surface layer and left over winter in order to hold snow and reduce wind action against bare soil. Refrain from plowing until close to planting time.

6. Cover crops are very effective against fall, winter and early spring wind erosion. Rye, ryegrass oats, buckwheat and barley are all effective.

7. A possibility for good winter and spring wind control may be the use of fall-planted oats as a cover crop. They will winterkill but remain to protect the surface. Sugar beets and beans can be planted on this surface providing a strip for each row is cleared ahead of the planter. Special equipment is necessary for this practice.

8. Strips of rye are successfully used to protect row crops from wind damage. The entire field is seeded to rye cover crop in the fall and strips of rye are left when plowing for row crops. Or, strips of rye are fallseeded at intervals across the field. The width of strips left for cultivation is carefully measured to provide an even number of rows, based on row spacing and size of equipment used. Rye strips should be not less than 7 feet wide and cultivated strips not more than 70 feet wide. Where the rye is to be harvested for seed, as is frequently done, the width of the rye strips can be based on the width of the combine.

9. Some growers report using a single sweep shovel on a cultivator. This shovel is set to provide a channel down the center of a row. The resulting ridge is effective in reducing wind action.

10. A long-time wind control measure is the use of tree windbreaks. These windbreaks should be 2 rows of trees planted north and south on farm boundaries. Single rows of trees could be used at 40 rod intervals. Wind protection is effective over an area which is 15 to 20 times wider than the height of the trees. Evergreens will provide year around protection. Recommended species will depend upon soil type. Farmers with a tiling system should seek advice on planting a windbreak. Roots may clog the tile if the wrong species is planted or if planting is made in the wrong location. Advice on planting, location, spacing and species, and a source of planting stock is available from the Cooperative Extension Service or your local Soil Conservation District.

Tuscola SCD photo

Beet and bean planter adapted to plant oat rows for wind protection.

Tuscola SCD photo

Oat strip planting following 8 row beet planter.

11. Consider strips of permanent vegetation, particularly on highly erodible sand ridges. Alfalfa for seed is a good possibility where drainage is adequate. While they may not get a seed crop every year, growers in the Thumb area report that yields of 3 to 8 bushels of alfalfa seed in good years make it profitable to grow the crop.

12. Maintaining good soil structure helps reduce erodibility of soils. The use of cover crops and return of all crop residues is important. In addition, including at least one year of grass or grass-legume crops in the rotation will increase the granulation or crumb structure which helps soils resist wind erosion and improves water intake of heavier soils.

13. Drill a small grain such as rye along with sugar beets and/or beans or vegetables. A row of small grain could be planted between every other row of crops. This row of grain could then be eliminated later by cultivation. This wind erosion control practice has been used for many years on organic soils.

14. If irrigation equipment is available, the application of water when surface soil becomes dry will reduce chances of it blowing.

Further study and experimentation will undoubtedly provide additional wind erosion control tools. However, through use of the above practices, effective reduction of wind erosion may be obtained.

Additional assistance with wind control problems can be obtained from your County Extension Agricultural Agents or from U. S. Soil Conservation Service technicians assisting your Soil Conservation District. Cost-sharing for applying many of these practices may be available to farmers from the Agricultural Conservation Program (ACP).

PHOTO CREDITS

Pictures used in this publication were furnished by the U. S. Soil Conservation Service; H. J. Belter, Berrien County Extension Service; Tuscola County Soil Conservation District; and John McGill, Farmers and Manufacturers Beet Sugar Association.

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