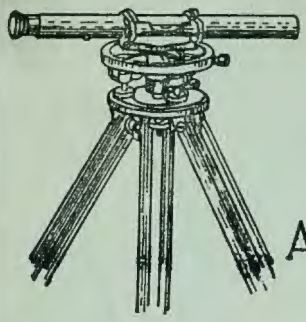

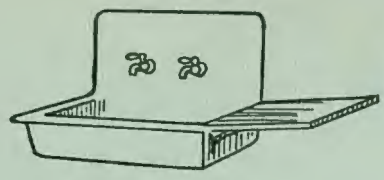

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FIRST PRINCIPLES OF SOIL EROSION CONTROL

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This News Letter is not intended to serve as a guide to soil erosion control practice. Its purpose is to emphasize, to those faced with the problem of soil erosion, methods and practices which scientific study and use have shown to be most effective in reducing sheet erosion.

Soil erosion by water is almost universal. It can never be entirely stopped but, by selection of suitable methods, it can be controlled and its worst ravages mitigated. If sheet erosion is well controlled, the gullying problem becomes negligible. The seriousness of erosion tends to be increased by intensity of rainfall, fineness and uniformity of soil texture, and steepness of surface slope. The latter is one of the most pronounced influences and, therefore, must serve as the basis of classification of soil erosion control problems, according to the most desirable control methods in a given case.

It is practically impossible to prevent free water from running down a slope, but many things can be done to check the *velocity* of flow. The control of the velocity of water flow over the surface is fundamental in soil erosion control because checking the velocity of flow reduces, in far greater proportion, the eroding energy of the flowing water, and its carrying power is, at the same time, much more greatly reduced.

All Types of Control Needed

No one method of control has a monopoly on effectiveness. Some combinations of mechanical and vegetative means, wherever possible to use both, are most generally effective. This has been found to be especially true of a combination of terracing and a carefully selected rotation of tilled crops, grain, and grass crops.

In some sections of the country terracing has long been considered the final and most effective means of control, but there are many areas where terracing cannot be used as, for example, those where the surface is largely composed of isolated knolls that offer no opportunity for terrace outlet channels, which are essential wherever terraces are used. In such cases contour tillage, with strip-cropping or, better, with continuous cover-cropping, seems the only complete solution.

Contour Tillage Fundamental

Performance of all field operations *on the contour* is almost universally approved as a first requirement in soil erosion control. Yet many still refuse to adopt it in the belief that it greatly increases the amount, arduousness, and expense of field travel—a belief that is clearly erroneous because everyone knows that even a wheeled vehicle is drawn up hill with much greater difficulty than when drawn on the level. The testimony of those who have tried contour tillage is practically unanimous that it is less arduous than straight-away tillage, uphill and down. While it may take a little more time because of short and irregular-shaped fields, this slight disadvantage is more than offset by the greater ease of always working along the level. As a means of erosion control the efficacy of contour tillage is clear because it continually cuts across the path of waterflow and tends to intercept it or, at least, greatly decrease its velocity.

Classification of Lands According to Slope

Experience in soil erosion control within the past few years has shown the wisdom of dividing lands into about the following slope classes in determining the type of control measures that should be used:

Slopes up to 4 or 5 per cent—Use of contour tillage together with a well-balanced crop rotation is sufficient if there is any serious tendency to erosion.

Slopes from 4 or 5 to 12 per cent—Terracing and contour tillage should be used. Strip cropping should also be included if the tendency toward erosion is severe.

Slopes from 12 to 20 per cent—These are too steep for terracing as usually practiced. They should be strip-cropped with emphasis on alternate strips of dense, vigorous-growing cover-crops in the rotation.

Slopes from 20 to 30 per cent—These should be kept in permanent sod, either meadow or well-controlled pasture.

Slopes steeper than 30 per cent—These should be taken out of agriculture and given over to stimulated development of tree growth and occupation by wild life.

Long slopes in the third class should be broken up by occasional diversion terraces spaced several times the distance apart for standard terraces. The function of these diversion terraces is to prevent the heavy accumulation of water and silt burden near the base of the slope with consequent incipient gullying and smothering of crops with a blanket of mud. Such terraces should be covered by a blanket of permanent sod extending 40 or 50 feet each way above and below the terrace channel as an extra precaution against silting of the channel and consequent overtopping and failure caused by heavy rainfall.

Purpose of Terraces

The fundamental purpose of standard terraces is two-fold: (1) to intercept the water flowing down the slope at intervals sufficiently frequent to check its velocity before it becomes highly eroding and silt-laden and to carry it off slowly to a properly protected outlet of sufficient capacity; and (2) to hold the water on the land longer in order to enable the soil to absorb more of it. The first is the major effective purpose. The second is very limited in practical results.

Purpose of Vegetative Control

The purpose of vegetative control is likewise two-fold: (1) to protect the soil surface from the direct loosening effect of rainfall beating upon it; and (2) to serve as a binding influence on the soil itself against the cutting action of the flowing water as well as to check its velocity of flow. Both the superstructure and the root system of the plant serve in this latter capacity, and anything that will stimulate vigor of growth of either or both will tend to increase the power of the plant to check erosion. Herein lies the great importance of soil fertility maintenance in soil-erosion control, although green and barnyard manures have an additional importance in that they increase the structural resistance of the soil itself to erosion. The selection of the most effective cover crop is an agronomic problem largely influenced by steepness of slope, type of soil, the life habit of the given plant, and the completeness of its response to the local fertility and soil moisture conditions.

Function of Subdrainage

Good underdrainage, also, is important factor in erosion control. It should be remembered that you cannot overdrain a mineral soil, that roots of most crop plants will not penetrate a saturated soil, and that well-drained soil stimulates the vigor of plant growth. This last is accomplished by enlarging the feeding ground of the plant roots, by aiding in the distribution of fertility throughout the root zone, by stimulating bacterial activity, and by keeping the soil open to the more ready absorption of soil moisture. Subdrainage further helps in erosion control by inducing greater runoff through the soil to the drains thus reducing flow over the surface and consequent tendency to increased erosion.

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