

HOW TO GET RICH LANDS

VI.—Soil Washing and Leaching: Their Relation to Soil Fertility

By B. L. MOSS

BY SOIL washing we mean the actual carrying away by water of the soil particles, there going along with these, of course, whatever plant foods they may contain. Leaching, on the other hand, is a term used to describe the process by which water, in percolating through a soil, carries with it some of the valuable plant food contained.

Our Enormous Loss From Soil Washing

ONE who stands beside a creek or river during the spring months when rains are heavy has visible evidence of what soil erosion or washing is costing us. Every hollow, branch, creek and river flows muddy with the best of our soils. Part of the matter carried by these flood waters may be deposited when the adjacent valleys are overflowed, but most of it is carried out to sea or deposited in swamps or marshes where it may never again be of use in helping to feed and clothe the world.

To a greater or less extent this wearing down of the earth's surface and carrying it away to lower levels is going on constantly, year after year, century after century; it is nature's ceaseless effort to establish a balance. But on rolling, cultivated lands everywhere in humid sections it has been an expensive process, in many cases actually ruinous, as is only too evident in the gullied hillsides thrown out to broomsedge and old field pines, a burden rather than an asset to their owners.

Soil Conservation First

AND even ahead of soil-building must come soil conservation—soil saving. For it will avail us little if we grow legumes and apply stable manures and commercial fertilizers, only to let the heavy rains carry away the plant foods they contain. Yet here in the South we see this very thing occurring every year. Fertilizers are poured upon unterraced hillsides, where no attention is paid to the direction in which the rows are run, gullies are allowed to grow deeper and wider, smaller and smaller crops are harvested despite the fertilizers used, and finally the field is abandoned to a kinder nature who, perhaps, after a generation, may succeed in clothing its nakedness.

Farmers who till rolling lands anywhere from Virginia to west Texas, from Kentucky to the Gulf, may as well decide at once that upon saving their hillsides depends their own economic salvation, and in saving these cultivated rolling lands, they must sooner or later come to the inevitable conclusion that some form of terracing is essential. In the next article in this series we will discuss in detail the problem of terracing rolling lands.

The Effect of Leaching

AS WE have already pointed out, soil washing takes place over the surface, while leaching refers to soluble plant foods carried away in the soil water without the actual movement of soil particles. A common example of leaching is afforded by the dripping of wood ashes to make lye. The water passing through the open, porous mass of ashes carries out and into the receptacle below the soluble matter, leaving little or no water soluble material in the ashes.

In like manner soil leaching occurs, though many factors affect the degree to which plant foods may be lost though many factors affect the degree consider some of these.

1. The degree of porosity, that is, whether the soil and subsoil are loose and open, or tight and retentive, great-

ly influences the degree of loss from leaching. An open, sandy soil with a sandy subsoil suffers more than any other from leaching, while a stiff clay soil underlaid with a tight clay subsoil may suffer scarcely at all.

2. The kind and form of the plant food in the soil is another factor affecting the degree of loss from leaching. Nitrogen is the plant food element lost to the greatest extent through leaching, and "nitrate nitrogen," that is, nitrogen in a form immediately available to plants, is lost most rapidly of all the forms of nitrogen. Thus the nitrogen in nitrate of soda, which is soluble in water, may when applied to land with a

sandy, open subsoil be rapidly carried downward out of reach of the plant roots, especially if very heavy rains follow shortly after it is applied. Organic nitrogen, such as occurs in cottonseed meal, dried blood and tankage, is leached out much more slowly, since it is insoluble in water until converted into nitrate nitrogen by chemical action, which takes place relatively slowly.

Experiments have shown that lime is leached out of the soil fairly rapidly when other conditions are favorable, while phosphoric acid and potash, because of their becoming "fixed" or largely insoluble in the soil water, are leached away in relatively small quantities.

From these facts, we are safe in concluding that we may apply phosphate and potash fertilizers at almost any time and on most soils without danger of any serious losses from leaching, but that nitrogen is an element that must be used with a

great deal more care, else heavy losses may occur. Nitrate of soda especially should not be applied until the plants are ready to use it, and on very sandy soils the other forms of nitrogen as well cannot be safely applied except around the growing crops.

3. Another factor affecting the amount of plant foods lost by leaching is climatic conditions. In the Cotton Belt, where the winter rainfall is heavy and temperatures relatively high, chemical action in the soil may continue through the winter, and the nitrogen thus made soluble is often leached away and lost.

4. Cover crops may in large measure prevent leaching, since the soluble plant foods are taken up and held by the growing plants.

5. Tillage encourages leaching, since its effect, through the aeration of this soil is to hasten chemical action, which in turn makes soluble the plant foods in the soil.

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