FIRST PRINCIPLES OF AGRICULTURE

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649423620

First Principles of Agriculture by Henry Tanner

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

www.triestepublishing.com

HENRY TANNER

FIRST PRINCIPLES OF AGRICULTURE

Trieste

PREFACE TO THE FIRST EDITION.

In the preparation of this elementary work upon the Principles of Agriculture, the author has been desirous of avoiding, as far as possible, the use of technical terms, in cases where other terms in general use would convey the same idea. When it has been necessary to employ such terms, they have been explained in the simplest possible manner, so as to render the book intelligible to all classes of readers. Although the work is strictly elementary, the author has considered it desirable to draw attention to certain points in practice and in theory, which seem to be insufficiently recognized by many of our practical and scientific agriculturists.

LONDON, January, 1878.

PREFACE TO THE SECOND EDITION.

THE rapid sale of a large edition, and the favourable opinions which have been expressed of its utility, encourage the hope that the "First Principles of Agriculture" has not only been found useful for pupils under instruction in the elementary stage of Agricultural Science, but of value to those who desire to inform themselves on the subject. The alterations which have been made in the Second Edition will probably increase its utility.

LONDON, December, 1879.

CONTENTS.

FIRST PRINCIPLES OF AGRICULTURE.

CHAPTER I.

THE SOIL.

1. **The cultivation of the soil** is commonly known as **Agriculture**, and the term usually includes the several operations and the general system of management whereby the farmer is enabled to grow corn, meat, wool, and various other marketable products. The success of his work is determined by his producing as large a supply as possible from the land, at the smallest cost to himself, and with the least injury to the soil. The object of the present work is to explain in familiar language some of the circumstances which influence these results.

2. The surface of the land consists of earthy matter, more or less finely broken, and this is called **the soil.** This may be termed the raw material which the farmer has to manufacture into products suitable for food and clothing. He uses the soil for these purposes, calling to his aid the agencies of animal and vegetable life, and the stores of fertility which are present in the atmosphere.

3. In some cases the soil is very shallow, and if you dig a hole in the ground you will soon reach the hard rock. In other instances there is a very considerable depth of earth, and thus we have both **shallow** and **deep soils.**

4. When a hole is dug into a deep soil—especially if it be what is known as a clay soil—we observe a marked change in the general appearance of the soil

some little distance below the surface: sometimes it is a difference of colour, sometimes a variation in the roughness, but whatever the difference may be, it is clear to the eye that there is a difference in the character of the soil. The portion that so differs from the surface soil is called the **sub-soil**, or under-soil. In speaking of the upper or surface soil we usually call it the soil, and that portion which lies below it is known as the subsoil.

5. The question naturally arises, how is it that the land is thus covered by this earthy matter, and **whence did the soil come?** Soils are produced by the breaking up or crumbling of rocks. If a rock were reduced into powder either by grinding, or by any other mechanical means, that pulverized rock would be a soil. But soils are not formed by rocks being pulverized by man's industry; natural agencies carry out this work very perfectly, sometimes with, and at other times without, our co-operation.

6. There are **three agencies** which thus turn rocks into soil, and thereby produce for the farmer the earth from which he makes his crops to grow. Water is one of these agents. If water falls upon or soaks into a piece of rock, it has a tendency to dissolve some portion of the stone, and then pass away with its spoil as soon as other water is ready to take its place. Thus, rocks are softened by **water** and some portions dissolved out of them.

7. Water also acts powerfully because it contains some **atmospheric air** in it. Rain-water in falling through the air takes into, and amongst its particles, some portion of the air through which it passes, and retains it. Thus water has generally some atmospheric air in it. This air is a mixture of two gases—oxygen and nitrogen—with some others in small proportions, but of the latter we now only notice one, carbonic acid.

8. When water carries into a rock the oxygen which it contains, this gas has a tendency to form chemical

combinations with some of the materials in the rock. When carbonic acid is also present it helps to dissolve in the water, portions of the rock which would not have been soluble in pure water. Thus the solvent action of water and its **associated gases** dissolves out certain portions of the rock, and thereby the rock has holes made in it, which gradually increase in size, and thus expose a larger surface to be subsequently acted upon by further supplies of water.

9. There is a third agency which exerts its influence, and often does so with great force, that is, **frost**. When the surface of a rock has been penetrated by water, and the temperature of the air falls below the freezing point, the water becomes frozen. As water freezes it gets bigger, and the particles of a wet rock are pushed apart so as to make room for the water which is freezing. When the frost has ceased and a thaw takes place, portions of the surface, being thereby released from the solid bands of ice, are thrown off from the rock. The extent to which this takes place depends in a great measure upon the size of the holes which the water and gases may have made in the rock. Sometimes the openings scarcely penetrate below the surface, and in such cases the surface of the rock only is affected; at other times large masses of rock are thrown off.

10. These three agents wear away our hardest rocks, and thus they are broken down and pulverized into soil. Softer rocks are of course acted upon more rapidly than hard rocks, but every rocky surface is thus made to yield its contribution to the soil. The lower forms of vegetation then establish themselves on this newly-made soil, and their rootlets penetrate and obtain their food from it. In due course these plants die, and add decaying matter to the soil, which thereby becomes fitted for the support of higher forms of vegetation, and these prepare the way for those of still higher organisation.

11. If soils so formed were allowed to remain where they were first produced, we should find very little difference between those soils and the rocks from which they were formed, except so far as regards their being in a more broken condition. But the study of geology shows that great changes have taken place on the surface of the globe, and that when soils have thus been formed from rocks, they have frequently been washed away and mixed with soils produced from other rocks. Soils of this character are often found in our valleys, and are distinguished as **alluvial soils.** In many cases these mixed soils have been again formed into rocks, and after long periods of time, these rocks have again become converted into soil. Animal and vegetable life have also exerted very great influences upon the character of many of these reconstructed rocks. Thus our soils differ very much in character and composition, according to the varying character of the rocks from which they may have been produced, and also according as they may have been more or less intermixed with other soils.

12. There are some soils which are not produced by these means, such as **Peaty Soils.** These consist of vegetable matter which has grown and decayed, generally in the place where these soils are found. Their mode of production is peculiar. They are generally found in places from which the water cannot easily pass away. Here aquatic vegetation and mosses establish themselves, and as they require a liberal supply of water for their growth, they flourish luxuriantly. Growth after growth takes place, decaying matter accumulates, which encourages further growth, so that ultimately the rising bed of peat is held only in check by the supply of water. When they have grown up as high as the water allows them to grow, tougher and more woody plants establish themselves; these give the harder and firmer surface which is found upon our peat bogs and mosses.

13. These peaty soils therefore differ essentially from the soils which have been produced by the pulverization or powdering of rocks. Peat soils consist almost entirely of vegetable matter, which often reaches as much as 97 per cent., and they contain very little mineral matter; whilst soils produced from rocks are chiefly composed of mineral matter, and have only a small proportion of vegetable matter.

14. For the convenience of being able to describe with accuracy the character of soils, so that soils of the same character may be called by the same names, it has become necessary to classify soils according to their texture and condition, as well as by their composition. The character is indicated by a mechanical analysis, and the composition is determined by chemical analysis. By these means we can inform ourselves with great accuracy as to the composition and character of any soil, and establish a regular classification.

15. The **mechanical analysis** of soils is largely based upon the proportions of clay and sand which they contain. The term **Clay** is applied to the finer portions of the mineral matter of the soil. These portions have by various means become so reduced in size that they are perfectly soft to the touch, and when pressed in the hand retain the form into which they may be moulded or pressed. The clay which is used for making bricks and pottery is familiar to every one. It is soft, and easily moulded in the hand, and when water is placed in any hollow on its surface the water does not readily soak away.

16. **Sand** is just the reverse. It really consists of very minute stones, and when pressed in the hand it is gritty and hard to the touch. If any attempt be made to mould it into any particular shape, it does not keep the form so given to it. If a hollow be made on the surface, and water be poured into it, the water quickly passes through it. In the sand upon the seashore we have a familiar example of the sand in soils.