

THE
Nature
AND
Properties
OF
SOILS

8th Edition

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THE NATURE AND PROPERTIES OF SOILS *8th Edition*

NYLE C. BRADY

Professor of Soil Science
New York State College of Agriculture and Life Science
Cornell University
and Director, International Rice Research Institute,
Philippines

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NUTRIENTS AND WATER. A deficiency of oxygen has been found to curtail nutrient and water absorption by plants. The exact reasons for the effects of aeration of these two processes are not well understood. However, these processes are known to be influenced quite markedly by the rate of root respiration. Apparently, the *energy* of respiration is utilized in bringing about at least part of the nutrient and water absorption. Since a supply of oxygen must be available if roots are to respire normally, a deficiency of this gas results in sluggish nutrient and water uptake. It is surprising as well as ironical that an oversupply of water in the soil tends to reduce the amount of water absorbed by plants.

The effect of aeration on nutrient absorption is of considerable practical significance. Under poor aeration conditions, for example, plants exhibit nutrient-deficiency symptoms on soils fairly well supplied with available nutrient elements. Also, on certain soils, improper tillage may destroy the granulation, leaving conditions which lead to *inefficient nutrient* utilization. The desirability of the frequent cultivation of heavy, poorly granulated soils when planted to row crops is undoubtedly related to this problem of nutrient uptake.

Soil aeration conditions in the field may vary drastically from day to day. Heavy rainfall, excessive irrigation, or flooding may bring about a temporary but complete absence of soil air. Plants will suffer, depending on their stage of growth and genetic tolerance (see Fig. 10:5).

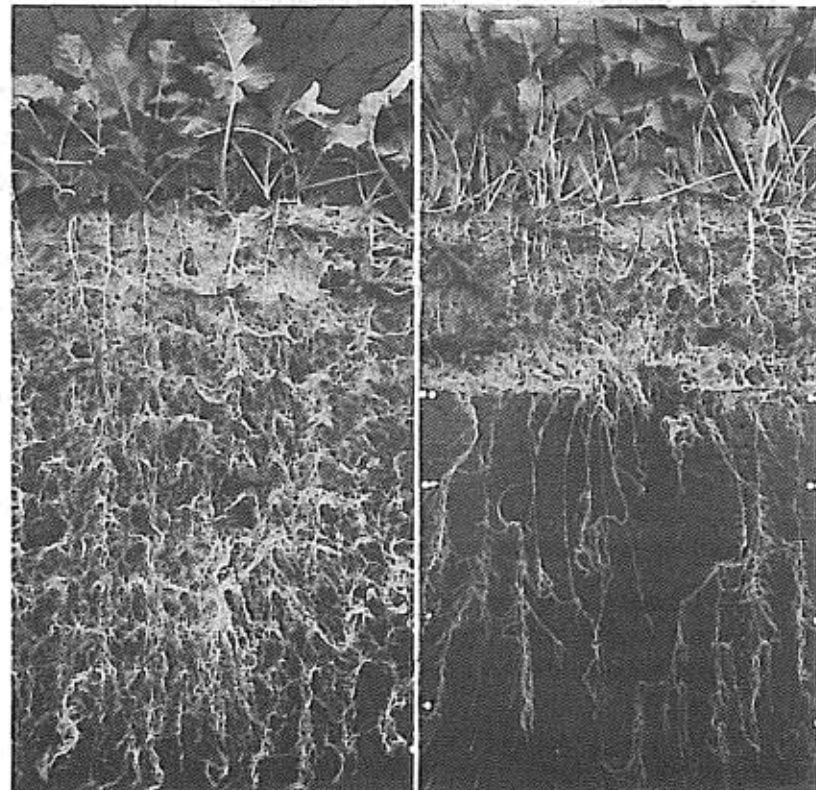


FIGURE 10:6. Effect of soil compaction on the development of the root system of the rape plant. (Left) Subsoil loosened before planting. (Right) Compacted layer at plow depth not loosened. [From work of H. C. de Roo, Connecticut Agricultural Experiment Station.]