I

INTRODUCTION

One of the essentials of water and soil conservation is to encourage the entry of the largest amount of water in to the soil. During rainfall or irrigation it is the quantity of water that enters the soil that really counts. Water entering the soil is usually accounted for in the following ways:- 1) movement downwards towards the water table. 2) storage in the upper layers of the soil to account for plant use and transpiration. 3) loss from the surface as evaporation. Infiltration or water intake is the movement of water from the surface into the soil. Percolation water or gravitational water is that part of intake water which moves downward in response to gravity and reaches the water table. The maximum rate of water intake of a soil is called its infiltration capacity. As a result of absorption or sorption, a part of intake water is retained in the soil through the direct and indirect effects of capillary or molecular forces. Capillary water held within the capillary pores inspite of the pull of gravity is mobile and at the same time much of it is available to plants. Hygroscopic water or unavailable soil moisture is held with tremendous forces in the form of thin films around or in soil particles. Apart from the amount of water evaporated from the surface of vegetation

it is the infiltration capacity of the soil that determines the runoff. Hence the infiltration capacity or the ability of the soil to absorb water has been the subject of much interest and is an important factor in determining runoff and erosion. If all the precipitation water is made to enter the soil, then obviously there will be no runoff and erosion, but this is hardly practicable since the rainfall rate often exceeds the infiltration capacity of the soil. The infiltration capacity varies with different soils and is due to the total amount and size of pore spaces and the stability of the pores during a strom. A combination of large and small pores gives both adequate moisture holding capacity and satisfactory water intake and transmission. Available storage capacity or available storage is the difference between the moisture content of the soil at anytime and the maximum amount that the soil can retain. As the soil moisture is removed, storage space in the soil is made available for the intake water, thereby increasing the infiltration capacity of the soil.

When the rate of intake of water into the soil is increased, surface runoff is correspondingly reduced resulting in decreased erosion and flooding thereby retarding reservior and flood plain silting, and finally ground water replenishment is also increased. Apart from

its effect in reducing runoff, increased water intake is essential to furnish the crop with the reserve of water, particularly in times of drought. By reducing runoff from upland fields and increasing the amount of water taken in by the soil and stored for use by plants during the growing season, crop yields can be increased. This problem is all the more important in soils of the laterite tract of West Bengal, where moisture deficiency is a serious limiting factor in crop production. Here almost all the total rainfall of the year is concentrated during the monsoon rainfall period of July, August and September. After the cessation of the monsoon rainfall, due to the excessive rate of evaporation of moisture from the soil, the crops grown in the succeeding months in the winter season are adversely affected by the lack of moisture in the soil. Hence in areas of low rainfall or in regions where the rainfall comes in intense storm, every effort will have to be made to conserve water for the use of growing crops.

Tillage which markedly affects the soil structure or the arrangement of the soil particles bring about changes in the infiltration capacity of the soil. However, such questions like how far and to what extent tillage practices influence the infiltration of water into the soil are yet to be fully answered. In this connection Rasmussen (1951) stated as follows: " whether mechanical treatment decrease or increase the infiltration

capacity, depends upon an overall view of sod and soil zones and requires study in each locality." To be of maximum benefit from the point of view of crop production merely increasing the infiltration capacity of the soil may not be of much value unless the water taken in by the soil is also retained by it. It is commonly assumed as stated by Bennett (1939), that those practical soil treatments which increase penetration of water into the ground do not cause increased losses by evaporation. This assumption as well as other aspects like rain drop action, grass land cover, cropping practices and tillage on the infiltration capacity of the soil and the moisture retained by it need detailed study and are of great practical importance.