

## Groundnut for the control of soil erosion

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**Introduction:** The soil of a country constitutes its most valuable natural resource, as it feeds the plants which provide all the three basic needs of man, viz., food, clothing and shelter. Soil formation is a very slow process and it takes more than 1000 years to build one inch of top soil, the most vital part of the soil profile. It should be realised that when this top soil is removed, either by wind or by water, 6000 years of nature's work goes to waste. Therefore, it is very necessary to preserve the soil from depletion by erosive agencies.

Soil erosion is receiving world-wide attention to-day. Although erosion has been going on for centuries, it is only in recent years that the enormous losses caused by erosion have been recognised. The United States of America was the first to realise the seriousness of the problem and set up soil conservation services. Intensive measures against erosion have also been taken up in the U. S. S. R. In most other affected countries, the need for control is recognised though work in this direction does not appear to have made much progress. In India about one half of the agricultural land is suffering from soil erosion. This accounts for the shortage of food for man and fodder for his cattle.

It is now recognised that erosion comes about through a wrong use of land, and the remedy is correct the utilisation, both of land and of water. Soil erosion is of three types viz., (1) sheet erosion, (2) gully erosion and (3) wind erosion. While the first two are caused by water, the third is brought about by wind. In the control of the first two types of soil erosion the measures practised fall into two main divisions viz., (1) the checking of the flow of water by use of vegetation and (2) checking the flow by controlling the slope down which the water flows. Though the loss of soil brought about by wind erosion is not so widely experienced, where it does exist it is very difficult to control. As pointed out by Sir John Russell, for full effectiveness, the plan requires the collaboration of the ecologist, the agriculturist, the forester and the plant breeder; the ecologists to ascertain what plant combinations are most appropriate, the agriculturist and forester to select those of most economic value, and the plant breeder to narrow the gap between the ideal plants and those actually available". In the prevention of all these three types of soil erosion by the use of vegetation the groundnut crop has a special utility. In this paper an attempt has been made to show how the special features of the groundnut crop make it particularly useful for controlling soil erosion.

**Sheet and gully erosion:** Sheet erosion occurs owing to flooding by heavy rains and water running off the land in sheets. This is responsible for the largest soil losses. Gully erosion is localised, making trenches in the soil which deepen every year, finally leaving flat land into a number of sub-divided plots which are not useful for profitable agriculture (6). These two types of soil erosion exist in varying degrees, depending upon a number of factors. The intensity of their evil effects is not proportionate to the total rainfall received by any place but to its uneven distribution in periodic, concentrated showers. Gorrie expresses the same idea by holding that an important factor in soil erosion is erratic rainfall occurring in a series of torrential storms. In arid regions where the soil is not easily permeable, the loss of surface soil due to sheet erosion by heavy rains is enhanced considerably. The lay and slope of the land, the texture of the soil etc. are other factors which influence the soil losses. Research on soil erosion in America (4, 5) has revealed that the run-off from cultivated land is less than that from uncultivated land. It has also been shown that under a suitable and well-balanced rotation, for example, corn, wheat and clover, soil loss occurred only during the growing season of the corn, while wheat and clover protected the soil.

It is recognised by all that in agricultural land where crops have to be grown, a judicious crop rotation is one of the important methods of prevention of erosion. Soil is lost only when it is unprotected and exposed to the action of heavy rains for a long period in the year. Thick-growing crops which cover the ground and which are effective in checking erosion must be included in the rotation. This, for prevention of soil erosion in cultivated lands a careful choice of crops to be grown is very important. The groundnut crop has to a very large degree just those characters which make it ideally suited for the prevention of soil erosion. Let us examine this aspect further. When heavy rains occur, sheets of water form in the field, holding within them the fine particles giving the familiar picture of thick, muddy water and they begin to flow down the gradient of the field finally finding a way out at the lowest point. Scouring may occur during this process if the slope is too great and gullies may develop. If the flow of water is impeded as much as possible, soil particles which came up floating in the water would settle down and the excess water alone would find its way out. With the velocity of the flowing water checked there would be no chance for scouring to occur or gullies to form. [This condition is fulfilled by the groundnut crop at all stages of its growth. The seed is sown with the first showers of the South-West-monsoon and within the first month after sowing the crop establishes itself on the ground, the vegetative part leaving barely any soil uncovered. When the heavier showers of rain are received the crop would be dense and spreading. This not only helps in receiving the first impact of the water but also aids in increasing its absorption by the soil. By the end of the second month flowering is in full swing and a large number of pegs (gynophores) would have penetrated into the soil forming so many points of support to the soil columns. To use an engineering analogy the whole soil foundation would be 'piled' to secure the stability of soil structure. This 'piled' system would last as long as the crop remains, that is to say, until the more intense rains of the North-East monsoon are over. The root system of the groundnut affords further protection to the soil layers. The most well-developed roots spread out



and inter-twine from even within the first inch of the soil in the early stages of the crop itself and form a thick mattress for the first sixteen to eighteen inches of the soil. It is extremely difficult for any soil to scour out from this layer of densely spread roots. In fact in our root studies of the groundnut even a water pressure of ten pounds to the square inch was found insufficient to release the soil particles around the roots.

Though the groundnut crop affords protection by means of its flat vegetative parts to the soil during the South-West monsoon, where the North-East monsoon is prevalent and torrential its value is enhanced inasmuch as the roots, shoot and the pegs would all have developed to their maximum extent. For example in the South and North Arcot districts of this State the showers of the retreating monsoon are the heaviest and the soil should have the maximum cover during this period. From the records of the monthly rainfall maintained at the Agriculture Research Station, Tindivanam (South Arcot District) it was observed that the heaviest rainfall is during the months of October and November. It is in the fitness of things that the South Arcot district is predominantly a groundnut tract so that when the most furious of the rains occur the groundnut crop would be in the full flush of growth, preventing the loss of soil which otherwise would happen.

There are two common varieties of groundnut, the bunch and the spreading, and it is only the latter by its prostrate habit and profuse branching that affords the fullest protection to the soil. This variety is, moreover, longer in duration by nearly a month than the bunch, extending the period of protection by that interval.

Mason Vaughn (2) mentions that the method of utilising vegetation in the control of erosion is confined to the use of cover crops and of strip planting and adds that a cover crop is a crop grown between major crops to cover the soil and prevent erosion when the major crops are not in the field. Any product of it beyond this is incidental, the purpose being erosion control and not yield. Generally in America, but not always, the cover crop is a legume which is used as a green manure. The requirements are that it should be dense, low-growing and that it does not rob the soil of readily available food needed by the next crop. Though such a practice is desirable, the cultivation of crops with the main object of reducing soil erosion may not have much chance of success in India. But if a money crop which has this property also in addition, is to be introduced it is possible that the ryots may adopt it. Happily, in the groundnut we have both these desirable qualities. By growing groundnuts, if not as a pure crop, at least as a mixture with others, the ryots stand to gain financially and the soil losses due to erosion are reduced considerably. Incidentally the productiveness of the land is also increased.

Studies on the relative efficiency of crop plants in checking soil erosion were made at the Dry Farming Research Station, Hagari from 1938-39 to 1941-42. Among the rainfed crops grown in the tract groundnut is the earliest to be sown and the longest to remain in the field. It is sown in June-July and harvested in November-December. Its habit of growth, especially in the spreading variety where the leaflets are all more or less flat on the ground is especially favourable in protecting the soil against erosion. The anti-erosive values of the groundnut when grown as a pure

crop as well as mixture with other crops were recorded at the station. It was found that the spreading variety of groundnut grown as a pure crop and when mixed with tenai afforded greater protection to the soil than the other crops. It had the maximum anti-erosive value, particularly in the top one inch layer of the soil which is most liable for erosion. It was also recorded in another experiment that the loss of water and soil is reduced by as much as 50%, by growing a groundnut crop of the spreading variety.

**Wind Erosion:** Wind erosion in our State is met with most frequently in the Ceded Districts where rainfall is low and the summers are very hot. The methods practised for its control are few and the only one that comes to mind so far as cultivated lands are concerned is the provision of wind breaks in the form of hedges, trees etc. The method is not entirely satisfactory, because there is no direct protection to the surface soil. Though the groundnut crop may not occupy the land throughout the year, during the period that it does, generally, between July and December when the gusts of wind which accompany the rains are severe, the protection afforded is complete. Very little of the soil can be carried away when a dense mass of vegetation covers the soil, further reinforced by the pegs of the groundnut.

### SUMMARY

Different types of soil erosion are described and the factors which cause them are discussed. The utility of the groundnut crop, with its dense, flat, vegetative growth, its extensively developed root system and the numerous 'pegs' formed after the commencement of flowering, is discussed in relation to the prevention of the different types of soil erosion. Though the commercial importance of the groundnut has been well recognised, its utility in reducing soil erosion as compared with the other dryland crops does not appear to have been realised. This article is meant to stress this aspect of the groundnut. From all aspects of view its widespread cultivation in drylands of this State is desirable.

### LITERATURE

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