



IMPORTANCE OF SOIL MANAGEMENT AND SOME TECHNIQUES FOR ITS CONSERVATIONS

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ABSTRACT:

Soil is a living, naturally occurring dynamic system at the interface of air and rock. Soil forms in response to forces of climate and organisms that act on parent material in a specific landscape (topography) over a period of time. Soil is the most fundamental and basic resource. Although erroneously dubbed as “dirt” or perceived as something of insignificant value, humans cannot survive without soil because it is the basis of all terrestrial life. Soil and land, whether it is biomass in the form of food, feed, bio energy, or biomaterials, play a crucial role in today’s life and underpin global efforts towards sustainable development. It underpins food security and environmental quality, both essential to human existence. Essentiality of soil to human well-being is often not realized until the production of food drops or is jeopardised when the soil is severely eroded or degraded to the level that it loses its inherent resilience. Management and conservation of soil resources is critical to human well-being. Their prudent use and management is more important now than ever before to meet the high demands for food production and satisfy the needs of an increasing world population. Despite the extensive research and abundant literature on soil conservation strategies, concerns of worldwide soil degradation and environmental pollution remain high.

Keywords: soil resource, degradation, management, conservation, sustainable development

INTRODUCTION:

The soil sustains most living organisms, being the ultimate source of their mineral nutrients. Good management of soils ensures that mineral elements do not become deficient or toxic to plants, and that appropriate mineral elements enter the food chain. Soil management is important, both directly and indirectly, to crop productivity, environmental sustainability, and human health. Because of the projected increase in world population and the consequent necessity for the intensification of food production, the management of soils will become increasingly important in the coming years. To achieve future food security, the management of soils in a sustainable manner will be the challenge, through proper nutrient management and appropriate soil conservation practices. Research will be required to avoid further degradation of soils, through erosion or contamination, and to produce sufficient safe and nutritious food for healthy diets.

Some people study soil because they are just curious about this unique and fascinating natural resource. When people dig a hole or scrape off a road cut, they discover right away that there is a lot more to the soil than just the top 8 to 10 inches. Soil scientists, in fact, study the soil to a depth of 5 to 6 feet or deeper. They see distinct layers, or horizons, in the soil. Together, the horizons make a soil profile. The horizons in a soil profile are described in terms of their properties. Some properties, such as color and root abundance,

can be determined by sight. Other properties, such as structure, require both sight and touch, while texture requires a keen sense of touch.

Soil Conservation is the name given to a handful of techniques aimed at preserving the soil. Soil loss and loss of soil fertility can be traced back to a number of causes including over-use, erosion, salinization and chemical contamination. Unsustainable subsistence farming and the slash and burn clearing methods used in some less developed regions, can often cause deforestation, loss of soil nutrients, erosion on a massive scale and sometimes even complete desertification.

Soil erosion removes the top soil that is necessary for organic matter, nutrients, micro-organisms that are required for plants to grow and shine. Soil conservation is one such step that protects the soil from being washed away. The soil then ends up in aquatic resources bringing in pesticides and fertilizers used on agricultural land. Healthy soil is important for plants to grow and flourish. Taking necessary steps to conserve the soil is part of environmentally friendly lifestyle. There are several ways to conserve soil that can be done through agricultural practices or measures you take at home.

MATERIALS AND METHODS :

A) Soil management

Technologies useful for managing soil erosion risks

Crop choice

Steeper slopes, without terracing, are often unsuitable for row crops such as potatoes or sugar beet: Perennial crops or grassland are better choices.

Crop rotation

The sequence of crops in a rotation should be planned to avoid leaving soils unprotected at times of maximum rainfall; in the UK, late sowing of winter cereal crops is a problem.

No-tillage and reduced tillage

Tillage is conventionally used to reduce weed pressure, but can leave soil more prone to erosion. No-tillage options, such as direct drilling combined with the use of herbicides or mechanical weed removal, may be effective, either long-term or occasionally in a rotation depending on the soil and weed pressure. However, care is needed to ensure that soil surfaces do not “crust” and become impermeable, which increases erosion.

Stubble and crop residue management

Retaining stubble and crop residues, or using green manures, helps hold the soil together and covers the surface with a water-permeable layer, helping reduce water flow and runoff

Mulches and manures

Applying mulches and manures also helps stabilize surfaces, reduce water flow and can improve soil structure and water-holding capacity as well as nutrients

Overgrazing

Overgrazing is a common issue and leads to a huge amount of soil erosion in both developing and developed countries. Organised grazing, allowing soils to recover between sessions, and appropriate stocking levels can do much to reduce problems. Serious erosion and soil damage can be caused around watering and supplementary feeding areas for livestock.

Tree planting (in pasture)

The most effective remedy against serious erosion (slips, slumps etc.) is to plant deep-rooting trees in a widely spaced pattern. In severe cases the soil should be retired from grazing and fenced. If possible, the affected hill slope should be replanted. Fertilisation helps the establishment of planted trees and helps slips to recover

Soil moisture content at harvest

According to recent research, soil moisture content at harvest seems to be the most important factor in soil loss due to harvesting. In general, the higher the moisture content the higher the soil loss. Farmers are therefore advised to avoid harvesting at times of high soil moisture content.

Retrieving lost soil from processing facilities

Where soil is lost, it can often be retrieved from washing/processing facilities. If possible this should be done, and the soil returned to the field.

B) Soil Conservation

Some of the methods that must be adopted for conserving soil are as follows:

1. Afforestation
2. Checking Overgrazing
3. Constructing Dams
4. Changing Agricultural Practices.

Soil conservation includes all those measures which help in protecting the soil from erosion and exhaustion. Soil erosion has been continuing over, such a large part of India for such a long time that it has assumed alarming proportions.

According to Prof. S.P. Chatterjee, “Soil erosion is the greatest single evil to Indian agriculture and animal husbandry”. Soil is our most precious asset and no other gift of nature is so essential to human life as soil. Productive soil alone ensures prosperous agriculture, industrial development, economic betterment and a higher standard of living. a healthy agriculture is bound up with healthy soil. While emphasizing the significance of conservation, G.T. Renner has said that conservation is defined as “the greatest good to the largest number for the longest time.” According to S.I. Kayastha, “With soil conservation people rise and with its destruction they fall.”

It has been estimated that about two thirds of our arable land needs conservation measures. There is, therefore, an urgent need to conserve soil for the sake of prosperity of our masses. Unfortunately, it has not attracted the attention that it deserves. Our peasantry is not fully aware of many benefits of soil conservation and neglect of soil is like killing the hen that lays the golden eggs

Following methods are normally adopted for conserving soil:

1. Afforestation:

The best way to conserve soil is to increase area under forests. Indiscriminate felling of trees should be stopped and efforts should be made to plant trees in new areas. A minimum area of forest land for the whole country that is considered healthy for soil and water conservation is between 20 to 25 per cent but it was raised to 33 per cent in the second five year plan; the proportion being 20 per cent for

the plains and 60 per cent for hilly and mountainous regions.

2. Checking Overgrazing:

Overgrazing of forests and grass lands by animals, especially by goats and sheep, should be properly checked. Separate grazing grounds should be earmarked and fodder crops should be grown in larger quantities. Animals freely move about in the fields for grazing and spoil the soil by their hoofs which leads to soil erosion. This should be avoided.

3. Constructing Dams:

Much of the soil erosion by river floods can be avoided by constructing dams across the rivers. This checks the speed of water and saves soil from erosion.

4. Changing Agricultural Practices:

We can save lot of our valuable soil by bringing about certain changes in our agricultural practices. Some of the outstanding changes suggested in this context are as In many parts of India, a particular crop is sown in the same field year after year. This practice takes away certain elements from the soil, making it infertile and exhausted rendering it unsuitable for that crop. Rotation of crops is the system in which a different crop is cultivated on a piece of land each year.

This helps to conserve soil fertility as different crops make different demands on the soil. For example, potatoes require much potash but wheat requires nitrate. Thus it is best to alternate crops in the field. Legumes such as peas, beans, clover, vetch and many other plants, add nitrates to the soil by converting free nitrogen in the air into nitrogenous nodules on their roots.

Thus if they are included in the crop rotation nitrogenous fertilisers can be dispensed with. By rotating different types of crops in successive years, soil fertility can be naturally maintained. For example, wheat may be cultivated in the first year, barley in the second and legumes in the third.

The cycle may then be repeated. Further, there are some crops such as maize, cotton, tobacco and potato which can be classed as erosion inducing, whilst some other crops such as grass, forage crops and many legumes are erosion resisting. Small grain crops like wheat, barley, oats and rice are between these two extremes.

(ii) Strip Cropping:

Crops may be cultivated in alternate strips, parallel to one another. Some strips may be allowed to lie fallow while in others different

crops may be sown e.g., grains, legumes, small tree crops, grass etc. Various crops ripen at different times of the year and are harvested at intervals. This ensures that at no time of the year the entire area is left bare or exposed. The tall growing crops act as wind breaks and the strips which are often parallel to the contours help in increasing water absorption by the soil by slowing down run off.

(iii) Use of Early Maturing Varieties:

Early maturing varieties of crops take less time to mature and thus put lesser pressure on the soil. In this way it can help in reducing the soil erosion.

(iv) Contour Ploughing:

If ploughing is done at right angles to the hill slope, following the natural contours of the hill, the ridges and furrows break the flow of water down the hill This prevents excessive soil loss as gullies are less likely to develop and also reduce run-off so that plants receive more water. Thus by growing crops in contour pattern, plants can absorb much of the rain water and erosion is minimised. When viewed from above, the field looks like a contour map

(vi) Terracing and Contour Bunding:

Terracing and contour bunding across the hill slopes is a very effective and one of the oldest methods of soil conservation. Hill slope is cut into a number of terraces having horizontal top and steep slopes on the back and front. Contour bunding involves the construction of banks along Contour Ploughing the contours. Terracing and contour bunding which divides the hill slope into numerous small slopes, checks the flow of water, promotes absorption of water by soil and saves soil from erosion. Retaining walls of terraces control the flow of water and help in reducing soil erosion. Sometimes tree crops such as rubber are also planted to combat soil erosion but there is a limit to which bunding is an effective measure of soil conservation. When the slope is steeper than 8 per cent or 1 in 12, bunding becomes expensive and less effective. Nothing over 20 per cent or 1 in 5 should be terraced. Fields of a slope steeper than 15 per cent or 1 in 6 should be withdrawn from ploughing as they are not usually worth the labour of making benches very close together.

(vii) Checking Shifting Cultivation:

Checking and reducing shifting cultivation by persuading the tribal people to switch over to settled agriculture is a very effective method of soil conservation. This can be done by making arrangements for their resettlement which involves the provision of residential

accommodation, agricultural implements, seeds, manures, cattle and reclaimed land.

(viii) Ploughing the Land in Right Direction:

Ploughing the land in a direction perpendicular to wind direction also reduces wind velocity and protects the top soil from erosion.

Conclusion

Pressures on the farm sector increase annually for a variety of reasons. Costs of production, seasonal hazards, climate change and prospective incorporation of agriculture into national and global CPRS are just some of the factors. The health of our soils is improving

where soil conservation methods have come into use.

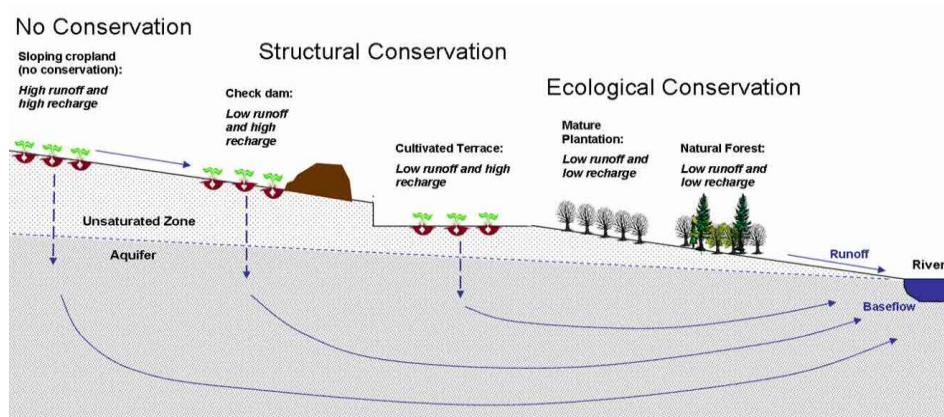
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