



### Agronomic Practices for Erosion Control

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Loss of topsoil through erosion leads to loss of plant nutrients and poor soil fertility. Agronomical practices like contour cultivation, use of cover crops, mixed/ inter/ strip cropping, crop rotation, green manuring and mulch farming are vital tools to check the soil erosion and conserve the basic resources of soil and water.

#### Introduction

Land is an important natural resource, as it is not only a medium for plant growth but also acts as a store house for water and nutrients. However, it suffers maximum for soil losses and water losses, as it is cultivated very frequently for the cultivation of various types of crops and very often remains exposed to rain and wind which results in accelerated erosion. Soil erosion reduces the depth of soil where it takes place, thus, reducing the soil moisture storage capacity and depth of feeding zone of crops. It also simultaneously depletes the soil nutrients, thus, restricting the choice of crops to be grown and reduction in production in the long run. Even if basic erosion control measures like contour bunds, graded bunds etc. are adopted continuously on cultivated land, the movement of soil and runoff from upstream to downstream remains continue. This can be considerably prevented by adoption of conservation agronomy practices. These practices help to

intercept raindrops and reduce the splash effects; help in better intake of water rate in soil by improvement in soil organic matter content and better soil structure; help in retarding and reducing overland flow of runoff through the crop geometry.

#### Contour Cultivation

The practice of up and down method of cultivation in many parts of the country is one of the causes of encouraging man made erosion. On steep slopes, this practice enables rain water to gain velocity, facilitating runoff water to erode soil. Thus, the upper layer of the fertile soil is washed away. Contour farming is a system of crop husbandry in which all cultivation operations are done on contour e.g. preparatory tillage, sowing, inter-culture etc. water and soil losses are reduced by contour farming. Contour farming provides the greatest possible conservation of rain water and on the other hand it reduces soil loss by water erosion. Purpose of contour farming is to place rows and tillage lines across the

normal flow of surface. The resistance developed by the crop rows and by furrows, between the ridges, to the water flow thus, reduces runoff velocity and gives more time to water to infiltrate in to the soil and, thus, store water in *situ*. Contour farming is of high value in semi-arid and arid regions where moisture is usually limiting factor in providing satisfactory crop cover against erosion.

### Use of Cover Crops

Erosion from cultivated fields can be reduced if the land has enough crop canopy during the peak season. Good ground cover canopy gives protection to the land like an umbrella. Cover crop is a close growing crop raised mainly for protection and maintenance of soil. Effectiveness of the cover crop depends on close spacing and development of good canopy for interception of rain drops so as to expose minimum soil surface for erosion. Major role of plant cover is to protect the soil from the force of falling raindrops which is the primary cause of erosion on cultivated land. The raindrops have energy and they scribe the bare soil and dislodge particles from the soil mass. These soil particles get lost through runoff. Plant cover controls splash erosion by intercepting the raindrops and absorbing their kinetic energy. Pulse crops are generally suitable for such purposes (Sharma and Dadhwal, 2011).

### Nitrogen Fixation by Legumes Crops

Introduction of short duration legumes crops in rotation may be helpful in reducing the nitrogen requirement of cereals (Singh et al., 2013). The symbiotic genus rhizobium,

commonly associated with the leguminosae has been recognized for its contribution to the nitrogen fixed by legumes in the growing season which varies widely from a few kg to 200-300 kg or even more (Berseem etc.). The shortage of fertilizer, thus, could be to some extent taken care of by the residual nitrogen left in the soil. A large part of the nitrogen fixed is utilized by the plant for its growth and development which gives better cover on the land, good protection to soil from beating action of rain and reduces soil erosion. A fairly good amount of nitrogen is also released to the soil which is made available to the succeeding crop.

### Strip Cropping

Strip cropping is a system under which ordinary farm crops are planted in relatively narrow strips, across the slope of the land and so arranged that the strips of erosion permitting crops are always separated by strips of close growing or erosion resisting crops.

#### *How do the erosion resisting strips act*

1. Check the velocity of the runoff water coming from the erosion permitting strips.
2. Act as a filter and arrest the eroded soil within the close growing strips.
3. Allow water to remain for a longer time in the soil and making it available to plants.
4. Give physical protection against blowing by wind.

There are four types of strip cropping: Contour strip-cropping; Field strip-cropping; Wind strip-cropping and Permanent or temporary buffer strip-cropping.

### **Green Manuring**

Green manuring can be defined as a practice of ploughing or turning into the soil under composed green plant tissues for the purpose of improving physical structure as well as fertility of the soil. There are two types of green manuring :

#### ***Green manuring in situ***

In this system, green manure crops are grown and buried in the same field which is to be green manured. The most common green manure crops grown under this system are sunhemp (*Crotalaria juncea*), dhaincha (*Sesbania aculata*) etc .

#### ***Green leaf manuring***

Green leaf manuring refers to turning into the soil green leaves and tender green twigs collected from shrubs and trees grown on bunds, waste lands and nearby forest area. This system is generally followed in southern India. The common shrubs and trees used are: Glyricidia (*Glyricidia maculata*), *Sesbania speciosa*, Karonj (*Pongamia pinnata*). Green manuring adds organic matter to the soil and improves its structure, it facilitates the penetration of rain water in to the soil profile and thus decreasing runoff and soil erosion. Beside this, it increases the availability of certain plant nutrient, like phosphorus ( $P_2O_5$ ), calcium, potassium magnesium and iron.

#### **Mixed/Inter Cropping**

It is a practice of growing more than one crop in the same field simultaneously. In this practice there is one main crop and one or two subsidiary crops. Generally, legume is used as one of the crops. This system of

cropping is very extensively adopted by the farmers in India. This practice gives better cover on the land, good protection to soil from beating action of rain and protection from soil erosion, by binding the soil particles. Growing soybean, groundnut, cowpea etc. with maize, jowar, bajra etc. is a common example of this practice.

#### **Crop Rotations**

Growing of crops in an order in which the chosen cultivated crops follow one another in a set cycle on the some field over a definite period for their growth and maturity with an objective to get maximum profit from least investment without impairing soil fertility. It is a matter of common knowledge that the crop grown year after year on the same soil depletes soil fertility. Also line sown and clean tilled crops promote soil removal. Thick growing crops protect soil agent the impacts of rain drops. They also intercept runoff. A proper rotation of crops not only maintains fertility but also helps in reducing soil erosion. A good rotation should include a cultivated row crop densely planted, small grain and a spreading legume.

#### **Mulch Farming**

Mulch is any material, organic or mineral in nature, such as saw dust, straw, paddy husk groundnut shell, crop residues, leaves, paper, stones, loose soil etc. which is spread on the surface of the soil in order to protect the soil from the impact of rain drops, avoid surface crusting, reduce evaporation and thereby conserve soil moisture. Mulch also serves to moderate surface soil temperature. Mulch farming is a system of farming in which organic residues or other materials are

neither ploughed into the soil nor mixed with it, but are left on the surface to serve as mulch (Aggarwal and Sharma, 2002). Mulch farming is not only useful for reducing soil and water loss but is also useful for maintaining high soil moisture in the field. Thus, mulching can be used in higher rainfall period/region for decreasing soil and water loss and in low rainfall period/region for increasing soil moisture. The natural sources of mulch are agricultural byproducts, for instance, straw, stubble, corn cobs, manures, wood chips. In agricultural practices it is best to “grow the mulch in place”, that is to use residues in the same field where they grew earlier.

### Conclusion

Soil and water are the most critical basic resources, which must be conserved as effectively as possible. No phenomenon is more destructive than soil erosion through which fertile topsoil and rainwater are lost. Erosion removes topsoil and exposes hard impermeable sub soil, increasing the chances of more run off. Erosion adversely affects soil physical properties such as loss of structure, reduced infiltration, soil depth

and soil moisture storage capacity. Agronomical practices like contour cultivation, use of cover crops, mixed/ inter/ strip cropping, crop rotation, green manuring and mulch farming are vital tools to check the soil erosion and conserve the basic resources of soil and water.

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