

### **Wind Erosion:**

Wind erosion is the movement of soil particles by wind. It is of concern when sand is blown to roads and public utilities. Like water erosion, wind erosion is a natural process shaping the earth's surface, changing land forms and transporting geological materials from one place to another. When stable soils are exposed to the force of wind by cultivation, deforestation, overgrazing or mining, then accelerated wind erosion can occur.

### **Types of wind erosion:**

There are 3 distinct types of soil movement which depend upon the size of soil particles. Soil can move in any of these ways.

- i. **Suspension:** It is the movement of very fine particles which are less than 0.1 mm in diameter. Soil particles are so small that once they are lifted into the air stream, they remain suspended in the air for long time.  
**Creep:** Creep may be defined as the slow mass movement of soil and soil material down relatively steep slopes, primarily under the influence of gravity but facilitated by saturation with water and by alternate freezing and thawing. It is the movement of soil particles at other extreme of the size range, greater than 0.5 mm. These particles are not lifted in the wind stream but are rolled along the surface of the ground.
- iii. **Saltation:** It is defined as the movement of particles in water or wind where particles skip or bounce along the stream bed or soil surface. It is the most important of all the three types of movement. Particles of 0.05-0.5 mm diameter move mainly by saltation. The particles are lifted in the wind stream and again fall down, moving by short leaps and bounces.

### **Mechanics of Wind Erosion:**

Like water erosion, wind erosion involves three processes:

- a. Detachment
- b. Transportation
- c. Deposition

The moving air results in some detachment of tiny soil grains from the granules or clods of which they are a part. However, when moving air is laden with soil particles, its abrasive power is greatly increased. The impact of these rapidly moving grains dislodges other particles from soil clods and aggregates. These dislodged particles are now ready for one of the three modes of wind induced transportation, depending mostly on their size.

### **Factors affecting wind erosion:**

Susceptibility to wind erosion is related to the moisture content of soils. Wet soils do not blow because of adhesion between water and soil particles. Dry winds generally lower the moisture content to below the wilting point before wind erosion takes place. Other factors that influence wind erosion are as below:

- I. **Wind Velocity:** Rate of wind movement will influence erosion. Wind speed of about 25 km/h is required to initiate soil movement. At higher wind speeds, soil movement is proportional to the cube of wind velocity.
- II. **Wind Turbulence:** It also influences the capacity of the atmosphere to transport matter. Although wind itself has some direct influence in picking up fine soil, the impact of wind carried particles as they strike the soil is probably more important.
- III. **Surface Roughness:** Wind erosion is less severe where the soil surface is rough. This roughness can be obtained by proper tillage methods which leave large clods or ridges on the soil surface. Leaving a stubble mulch is probably an even more effective way of reducing wind borne soil losses.
- IV. **Soil Properties:** In addition to moisture content, several other soil characteristics influence wind erosion are:
  - a. Mechanical stability of soil clods and aggregates
  - b. Stability of soil crust
  - c. Bulk density and size of erodible soil fractions.
  - d. Presence of clay and organic matter and other cementing agents.
  - e. Size of soil particles as aggregates of about 0.1 mm diameter are more erodible than those larger or smaller in size.
- V. **Vegetation:** Vegetation or a stubble mulch will reduce wind erosion hazards, especially if the rows run perpendicular to the prevailing wind direction. This effectively slows wind movement near the soil surface. In addition, plant roots help bind the soil and make it less susceptible to wind damage.

### Control of Wind Erosion:

- i. **Soil Moisture:** Since soil moisture increases cohesiveness, wind speed required to detach soil particles increases as soil moisture increases. Therefore, where irrigation water is available, it is common to moisten soil surface when high winds are predicted. Unfortunately, most wind erosion occurs in dry regions without available irrigation. A vegetative cover also discourages soil blowing especially if the plant roots are well established. In dry farming areas, however, sound moisture conserving practices require summer fallow on some of the land and hot dry winds reduce the moisture in the soil surface. Consequently, other means must be employed on cultivated lands of these areas.
- ii. **Tillage:** The effect of tillage depends not only on the type of implement used but also on the timing of the tillage operation. Tillage can greatly reduce wind erosion if it is done while there is sufficient soil water to cause large clods to form. Tillage on a dry soil may produce a fine, dusty surface that aggravates the erosion problem. Tillage to provide for a cloddy surface condition should be at right angles to the prevailing winds. Likewise, strip-cropping and alternate strips of cropped and fallowed land should be perpendicular to the wind.
- iii. **Barriers:** Barriers such as shelter belts are effective in reducing wind velocities for short distances. Various devices are used to control blowing of sands, sandy

loams and cultivated soils. Windbreaks, grasses and shrubs are especially effective.

### **Control of Soil Erosion:**

Following steps may be taken to control soil erosion.

- I. **More vegetation on hilly areas:** If soil surface remains covered with trees, grasses etc., it will not allow soil particles to be washed away and thus, erosion is checked. Generally a cover of dense vegetation is effective in retaining soil and rainfall. Another advantage of vegetation cover is that it reduces the beating action of rain drops that dislodges and removes soil.
- II. **Bunds Making:** If strong bunds are made around the fields, rain water instead of flowing away will accumulate in the fields and as such erosion will be controlled.
- III. **Avoid grazing** of the animals on the sloppy lands.
- IV. **Soil leveling:** If soil is well leveled, runoff of water will be stopped and as a result erosion will be checked.
- V. **Soil ploughing across the slope:** If soil is not well leveled and is sloppy, then ploughing of soil across the slope will decrease the velocity of flowing water and erosion will be checked.
- VI. **Building of small dams** in the gullies will check the flow of water.
- VII. **Wind breaks:** Planting of trees around the area will reduce the wind velocity and will protect the flat land from wind erosion especially in areas where winds blow with great force.