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## Causes of erosion

Erosion happens when water (runoff from slopes) or wind carry away soil particles

Fields are vulnerable to erosion if:

- Soil is left bare (reduced plant cover)
  - From overgrazing or use of herbicides
- Soil structure is degraded
  - Low organic matter content
  - Compaction by heavy machinery
- Small fields are consolidated into larger ones
  - Allowing higher wind & water speed
- Windbreaks are absent
- Slope protection is absent



Effect of water erosion [1]



Wind erosion [2]

2

## Erosion control methods

2.1

General practices to keep soil covered & improve soil structure

### Grow cover crops:

- Plants grown in between the rows of cash crops or in between two seasons of cash crops
- Keep soil covered, improve structure by roots & additional organic matter
- Additional benefits:
  - Increased soil fertility
  - Reduced damage from pests & diseases
- For all information how to grow & manage cover crops, see the Soil & More Impacts poster 'Cover crops'



Banana plants intercropped with *Stylosanthes guianensis* [3]

### Apply mulch:

- Process of covering the topsoil with plant material such as leaves, grass, twigs, crop residues or straw
- Keep soil covered, improve structure by activating organisms & additional organic matter
- Additional benefits:
  - Weed suppression
  - Reduced evaporation

Which material to use:

- Any organic material available
- Material with high C/N-ratio (straw, bark) provides longest protection, but may cause nitrogen limitation to the crop

When to apply:

- Before or at onset of rainy/windy season
- After crops have established when growing vegetables
- Hardy crops can be planted directly in the mulch layer



Young seedlings in mulch layer from crop residues [4]

## 2.1

General practices to keep soil covered & improve soil structure

### Incorporate compost or residues:

- Process of adding organic material in the top layer of the soil
- Improve structure by increasing soil organic matter content
- Additional benefits:
  - Increased soil fertility
  - Stronger crops
- For all information how to make & apply compost, see the Soil & More Impacts poster 'Small-scale compost making'



Finished compost [5]

### Minimalize soil disturbance:

- To practice reduced or zero tillage
- Improve structure by conserving soil organisms and preventing compaction
- Additional benefits:
  - Fewer cultivations are needed

Example of a reduced tillage system from Honduras:

1. Vegetation is cut down to the soil level
2. Soil is opened along contour lines at plant row distance
3. Organic manure is applied into the rows
4. The crop is sown into these rows
5. The vegetation in between is cut regularly and used as mulch



Direct seeding [6]

## 2.2

Specific practices against wind erosion

### Plant wind breaks:

- Lines of trees or shrubs whose main aim is the reduction of wind speed
- Additional benefits:
  - Reduced evaporation
  - Wood production

To design a windbreak:

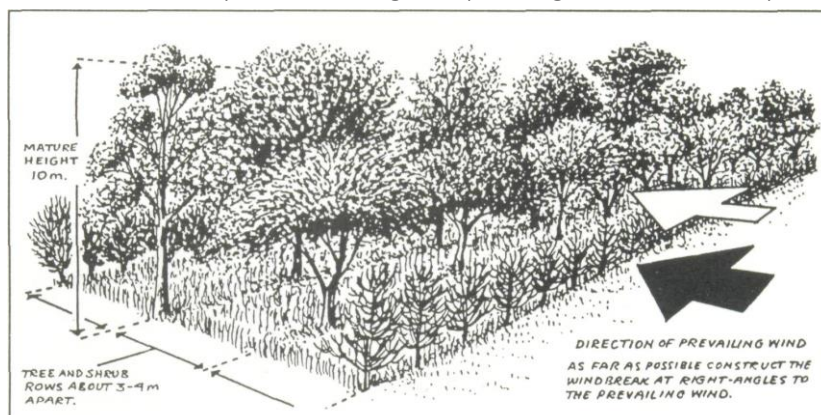
- Perpendicular to the prevailing wind direction
- Do not let it grow too dense, some wind should go through

To construct a windbreak:

- Plant one or two lines of trees
  - With one line, space trees at 1.5-2 m
  - With two lines, space trees at 4-5 m within the line and 2-4 m between the lines
- Optionally, plant a line of shrubs on the side facing the prevailing wind
- Carry out weeding and pruning when necessary

### Reduce field size:

- Decrease field width or length
- To reduce wind speed and erosive capabilities of particles



Trees and shrubs as windbreaks [7]

## 2.3 Specific practices against water erosion

### Contour farming:

- Practice of planting along the topographic contours of the field, making horizontal rows along the hill
- To reduce speed of water runoff on slopes
- Works best on slopes which are not too steep

To set the first contour line:

- Use an A-frame

To set following contour lines:

- Stand straight with one arm outstretched in front
- Walk backwards down the slope, looking at your outstretched hand, until the previous contour can be seen at the end of your hand.



Contour farming [8]

Additionally, contour trenches can be constructed

- Dig a ditch along the hill, following the contour line
- Use the excavated soil to form a berm on the downhill edge
- Plant the berm with permanent vegetation



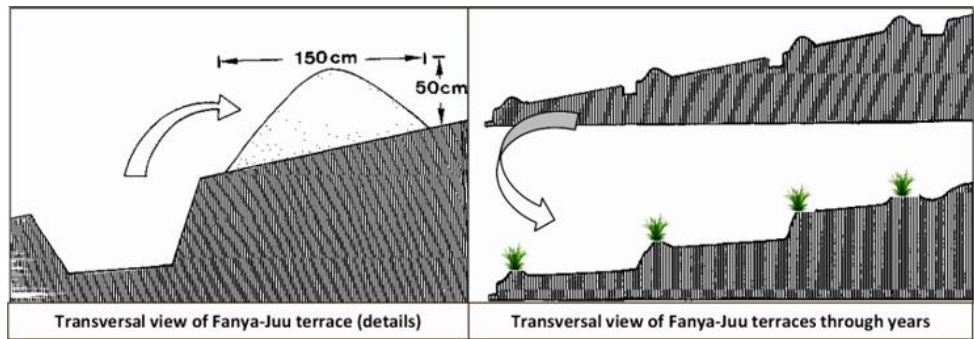
Contour trenches [9]

### Construct terraces:

- Horizontal plateaus on which crops can be planted
- To reduce speed of water flowing down on slopes
- Necessary on steep slopes

To build a Fanya-Juu terrace

- Set contour lines
- Dig a trench
- Throw the excavated soil uphill to build a bund
- Plant permanent vegetation on the bund
- Over the years, the soil on the terraces will level off



[10]

### Construct grassed waterways:

- Broad, shallow channels covered by grass
- To reduce speed and transport water through designated channels
- Works best on large fields (20 ha)

To build a grassed waterway:

- Design the bottom slightly parabolic
- Timing of sowing is important: make sure the grass can establish before start of the rainy season
- If using machinery, travel perpendicular to the waterway



Grassed waterway [11]

### Prevent over-watering:

- Over-watering can speed up erosion by washing away soil
- Use less water if you can, or install a drip irrigation system

Picture sources:

- [1] [2] [www.bzfe.de](http://www.bzfe.de) [3] [www.cirad.fr](http://www.cirad.fr) [4] <http://www.climatechwiki.org>  
[5] SMI [6] <http://www.knowledgebank.irri.org> [7] [www.worldagroforestry.org](http://www.worldagroforestry.org)  
[8] [www.csmonitor.com](http://www.csmonitor.com) [9] SMI [10] [www.FAO.org](http://www.FAO.org) [11] [www.omafra.gov.on.ca](http://www.omafra.gov.on.ca)