

EROSION

How to Protect your Soil

A healthy topsoil is a great asset to have, as this layer of soil contains the highest concentration of organic matter, micro-organisms, nutrients and biological activity. Lost topsoil can't be replaced in a human's lifespan. Therefore erosion, probably the biggest culprit in the loss of topsoil, should be effectively managed.

What causes erosion?

The two main environmental elements causing erosion are **wind** and **water**.

The impact of wind and water can be exacerbated by the slope of the land, the amount of rainfall in the area, the land use management practices and proximity to waterways.



Loss of topsoil due to wind.

Reducing the impact of wind

Dust, exposed subsoil, rocks and roots, and the accumulation of soil or organic matter against a surrounding fence, are clear signs of soil erosion taking place due to wind.

Wind can only cause erosion if it can make contact with the soil. The first line of defense is to minimize the area of exposed soil. However, if this is not possible or isn't working, the next tool is to reduce the speed that the wind makes contact with the soil.

If you farm in an area prone to strong winds or your soil is likely to lay bare between your main planting periods try the options listed here to reduce the impact of wind on your soil.

1. Cover exposed soil areas by:

- Planting any uncultivated area with grass, or enable native vegetation to grow.
- Planting inter-row or under-tree ground covers.
- Avoiding cultivation in periods of high winds.
- Keeping the time between harvest and your next planting as short as possible.
- Using a cover crop during germination of seedlings.
- Spreading organic mulches, slashed material or crop residue over exposed areas.

2. Reduce wind speed by constructing or planting a shelterbelt/windbreak that:

- Allows 30%-50% of the wind to pass through.
- Is no more than 20 times the height of the shelterbelt/windbreak distance away from the soil area that needs protection.

3. Improve your soil structure and cohesion between soil particles by:

- Incorporating organic matter into the soil and using minimum tillage systems.
- Watering the soil prior to experiencing strong winds.

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Reducing the Impact of Water

High volumes of water and water flowing at high speeds, cannot only destroy your crop, but also your topsoil. The appearance of gullies in your field is a sure sign of soil erosion caused by water.

Water-caused soil erosion can be minimized through an effective irrigation and drainage system.



1. Manage your irrigation system by:

- Carefully monitoring the amount of water during irrigation. Big droplets will loosen soil particles and excess amounts of water will remove loose upper soil particles, which will be lost in the run-off water.
- Controlling the speed at which water moves through your planted area. This is of particular importance when planting on a slope. The higher the speed, the higher the possibility of soil particles being washed away in the run-off water.

2. Control run-off water by:

- Planting according to the natural contour lines if planting on a slope.
- Establishing **grassed waterways**.

What are grassed waterways?

Grassed waterways are wide, shallow grassed channels that carry a large volume of water quickly down a steep slope.

They are constructed to spread water evenly over the grassed surface and allow mechanical access for slashing or regular maintenance.

Grassed waterways are usually 2.5 meters (m) wide with a minimum depth of 100-200 mm.

Irrigator runs can also be grassed and used as a waterway. After construction, grassed waterways and irrigator runs should be sown with perennial ryegrass, fescue and white clover at twice the normal rate and fertilized.

- Slowing the speed of run-off water by installing **contour, diversion or v-drains** to direct water onto grassed waterways.

What are contour drains?

Contour drains are temporary features that collect run-off water from within the crop and divert it into grassed irrigator runs or waterways.

They are installed immediately after planting and should be no longer than 50 m, 15-30 cm deep and installed with a 20 – 40 m spacing on a slight slope, to prevent silting.

In stable soils, contour drains are installed at a 5 - 6% slope and at a 0.5 - 2% slope on erodible sandy soils.

Contour drains may impact on other cropping operations such as spraying and harvesting.

- Interrupting run-off water with **grassed/mulched rip** lines if growing on long slopes.

What are mulched rip lines?

Mulched rip lines can be used to replace contour drains. Unlike contour drains, mulched rip lines do not require the construction of a ditch. It consists of two shallow rip lines and a trail of straw mulch (3-4 square bales of straw per hectare) on the soil surface.

As with contour drains, the spacing between mulched rip lines, is generally between 20-40 m depending on slope, soil type, crop to be grown, organic matter levels, and likelihood of a heavy rain event.

An advantage over contour drains is that mulched rip lines don't impact on other cropping systems.

- Preventing water from other areas flowing onto your planting area, by establishing cut-off drains or banks.

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3. Cover exposed soil areas, improve soil structure and increase cohesion between soil particles.

Many of the preventative measures taken to prevent soil erosion by wind, can also be applied to reduce the impact of water on exposed soil areas.

Ground covers prevent raindrops from directly striking the soil surface, and it allows rainfall to slowly penetrate the soil surface.

Ground covers can be obtained by **retaining crop residues** or **sowing a cover crop**.



Retaining crop residue to protect your soil

Maintaining crop residue can be achieved using a number of different tillage systems such as strip tillage (shown in photo above) where crop residue is removed only from the row area. Retaining stubble can do good things for your soil (such as increasing organic matter and reducing erosion) but may require the introduction of new planting techniques and equipment.



Incorporating a cover crop into the soil.

Sowing a cover crop to protect your soil

Increase organic matter in your soil by incorporating green manure, or cover crops like ryegrass or legumes, into cropping rotations.

The amount of organic matter returned to the soil depends on the amount of vegetative material, soil biological activity and climate factors.

Typically a green manure crop of oats would return 6 tonnes/ha of dry matter to the soil, of which 25% would be converted into organic matter. This provides a return of 1.5 tonnes/ha of organic matter or a 0.08% increase in organic matter to a 20 cm thick layer of topsoil.

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