FACTSHEET

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RURAL SOLUTIONS SA PIRSA

Emergency measures to curb wind erosion.

Wind erosion on agricultural land is usually avoided or mitigated by keeping soils covered by vegetation and minimising soil disturbance by machinery or animals.

Occasionally soils become bare of cover or are loosened to the extent they start to suffer wind erosion. This occurs at times such as during drought, after fire, following clover harvesting or on areas that have been heavily stocked for a length of time.

During these times “emergency” measures are taken to prevent or check wind erosion. These are treatments that stabilise the soil until protective cover can be re-established on it.

The aim of these treatments is to roughen the soil surface, reduce the velocity of wind sweeping over it and deflect the wind upwards and away from the ground.

The importance of clay and clods

Soil texture, or more specifically the amount of clay in the soil, is a key factor in deciding which treatment to use.

The aggregation, or “cloddiness” of a soil is important in protecting soils from wind erosion. In a small clod of clay there are millions of particles bound together by ionic bonds, electromagnetic forces and organic matter. Clay also has the ability to store more water in its matrix thus making the soil heavier and harder to be picked up and carried by wind. Sandy soils are made up of singular, inert particles that are often only bound together by water.

Forming "ribbon" of soil to assess clay proportion.

The texture of the soil at risk of erosion, both in the topsoil and layers beneath, can be determined by doing a field texture test. This is done in the paddock by dampening and moulding soil in the hand, then squeezing the soil between the thumb and forefinger. The length of the ribbon of soil formed indicates how much clay is present in the soil. (YouTube videos on the internet show how to assess soil textures in the paddock).

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Texture	Clay %	"ribbon" length
Sand	< 5 %	0
Loamy sand	≈ 5 %	5 mm
Clayey sand	5–10 %	5-15 mm
Sandy loam	10-20 %	15-25 mm
Loam	≈ 25 %	≈ 25 mm
Sandy clay loam	20– 30 %	25–40 mm
Clay loam	30–35 %	40-50 mm
Light clay	35–40 %	50-75 mm
Heavy clay	> 50 %	>75 mm

Select treatment based on soil type.

Where soils have sufficient clay (> 20 %), wind erosion treatment measures involve roughening the soil surface by leaving clods of soil on the surface which slow and break up wind flow. This is done using tillage machinery.

In soils with very little clay, adding and mixing clay into the topsoil will help it aggregate and form clods of soil more resistant to wind erosion. Adding clay to sandy topsoils can also have long term benefits such as improved water holding capacity and fertility. However, the clay must not be sodic or high in carbonate as these attributes will cause problems in the topsoil.

Soil type	Treatment
Sand, loamy sand, clayey sand > 1m depth	Do nothing – avoid disturbing soil in any way. Import clay; spread, level and incorporate into topsoil (clay spreading).
Sand over clay – clay within 1m of surface	Remove surface soil to expose clay; extract clay; spread, level and incorporate into sand (clay spreading).
Sand over clay - clay within 60 cm of surface	Rip into clay layer; bring clay to surface; level and incorporate (delving).
Sandy loam to heavy clay	Rip or cultivate to leave clods on surface.

"Do nothing".

On sandy soils that will slump immediately after tillage and cannot be delved or clay-spread, the best option is to do nothing. Disturbing the soil with machinery, vehicles or animals will break up soil aggregates and loosen soil particles.

Sandy soils can develop an "armouring" following wind erosion where the finer particles are winnowed out of the top few millimetres of soil. A thin layer of heavier, coarser particles that are more resistant to erosion is left on the surface. Keeping this surface seal intact can provide some protection against wind however it will not withstand the erosive force of strong winds laden with sand. Care must be taken that the surface layer is not disturbed by vehicles or animals.

"Doing nothing" is an option if surface armouring has developed, windy weather has abated, and it is likely that sufficient rains to stimulate plant growth will fall within a few weeks.

Clay spreading and delving.

Clay spreading and delving treatments require careful planning and implementation to ensure they work well. Special machines are needed that are not always readily available. Finding machinery or contractors to do the work takes time so wind erosion on sandy soils might not be able to be treated immediately. Good analysis of the soil over the whole area to be treated, the clay to be used and calculation of rates to be spread or delved is required. Planning how the clay will be incorporated or the surface levelled is also necessary so that when rain falls, the treated area is ready to be sown.

Adding clays to sandy topsoils can improve soil fertility and water-holding capacity, and overcome non-wetting problems, leading to improved plant growth. If it is undertaken as part of an overall soil improvement program, it will also improve the soils resistance to wind erosion.

Further information on clay spreading and delving is available in “Spread, delve, spade, invert: a best practice guide to the addition of clay to sandy soils” available from the Grains Research and Development Corporation’s website and other websites.

Clay spread over sandy rise.

Ripping or cultivation.

Cultivation can be implemented quickly although now that many farmers are practising no-till or zero-till farming, suitable machinery might not always be readily at hand. The most difficult matter to decide is whether to minimise disturbance of the soil as much as possible by cultivating sparingly in strips, or to roughen the whole area by cultivating it all.

If erosion is not already occurring, using a single tine ripper to create a deep furrow with high cloddy ridges might be sufficient as a preventative measure. Rip lines can be spaced 10 – 20 metres apart. On sloping land, rip lines on the contour of the land will reduce the risk of water

erosion. Strips of rough cultivation can also break up wind sweep across bare, open areas and is often used after clover harvesting or stone picking.

Ripping after medic harvest.

Ripped furrows on pastoral land.

Where land is eroding, a cultivator to work strips of land or the whole area might be required. Cultivation should aim to make the soil surface as cloddy as possible. Digging below the usual tillage depth and travelling very slowly will bring more lumps to the surface. Working at normal tillage speeds tends to break clods up more and create more dust.

Strip cultivation on burnt land.

On very clayey soils, one cultivation should be sufficient to reduce wind erosion and provide protection until enough rain falls to stimulate plant growth. However, the rough condition of the soil will make it difficult for spraying and seeding operations so some form of levelling (e.g. rolling) might be required.

The ridges and clods on less clayey, cultivated soils will slump and furrows will fill with soil over time. Consideration will need to be given as to whether these soils should be cultivated again, based on the likelihood of windy weather and rain.

Loam soil cultivated with narrow points.

Sandy soil starting to slump and furrows filling within a few days of cultivation.

Clay clods brought to surface by 15 cm depth cultivation.

Protecting assets from soil deposition.

Severe wind erosion can lead to soil accumulating in, around or on top of buildings, fences, trees, roads, troughs, tanks, pipes and pumps. Temporary wind barriers can be made around or on the windward side of assets to trap soil before it reaches them. Barriers can be made of bales of straw or hay, shadecloth and iron droppers or other such materials. They will become buried under soil so must be able to be cleaned up and removed later.