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Storm: [wind erosion in the Great Southern]

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Storm

The extent

In an area roughly bordered by the Great Southern railway line to the west and Esperance in the east, a strip of land some 150 km wide along the south coast, was affected by dust storms.

If 25 mm or more of rain had not fallen to the north and west in the 48 hours before the wind storm, a much wider area would have also been damaged. The northern parts of the Esperance region (Mallee portion) received up to 10 mm of rain before the wind storm. This also reduced the erosion risk.

Damage to paddocks was variable, as would be expected given the variation in past seasonal conditions, paddock management and soil types across such a large area. In the western portion, from Katanning to about Ongerup, only one in ten paddocks blew. On some paddocks the visibility immediately downwind was less than five metres.

Further east of Ongerup, the proportion of blowing paddocks increased to a maximum of about nine out of ten. This high proportion dropped across to the eastern south coast where the damage was not as extensive as the central south coast.

Why did it happen?

The paddocks most affected were pastures with very little cover and stubbles in their second year after cropping. The stubbles were unstable because the roots had rotted during the previous winter. The winds were strong enough to move the above-ground residues, leaving the surface bare and exposed.

The central south coast received only 150 mm of rain for the 1994 growing season, which severely limited the growth of pastures; in some parts no growth was recorded in the spring of that year. Even if they had not been grazed, the dead pastures would have deteriorated over the summer to such an extent that ground cover would have been insufficient to prevent erosion. The amount of erosion was then dependent on how loose the soil was.

The low rainfall in 1994 increased the erodibility of cropped paddocks because rain tends to pack down cultivated soil. The absence of this compaction makes the soil more prone to detachment and stubble dislodgment when sheep graze the stubbles. On barley and lupin paddocks, the soft soil and reduced anchorage resulted in the stubble being blown out of the ground. On the contrary, canola stubbles were noticeable for the protection they gave to the soil and lack of erosion. This may have been because of the low feed value in the stubbles and consequent lower grazing pressure on those paddocks.

In a few cases, burning of stubble or dry pastures increased the erosion risk. If burning is the only option the stubbles will have to be lightly grazed to prevent soil detachment and limit the amount blown away. A similar situation existed with pasture manipulated paddocks where grasses were selectively removed before the cropping phase. These paddocks had less than usual cover and should have been managed in a similar way to the burnt paddocks.

Erosion damage and its effects on productivity

Sandy soils were those most at risk of erosion but heavier soils, such as the grey clays around Ongerup and the red yate country along the major river systems were also damaged in this storm. On one grey clay the depth of erosion was 3 mm. The erosion had scoured the topsoil down to a hard surface that prevented any further erosion. In many cases the depth of erosion was limited by a moist layer of soil just below the dry surface.
The total effect of the erosion on future productivity can only be surmised. With very approximate calculations based on visibility (2.8 mg per cubic metre of dust in the air), volume of the air mass (450 km x 500 m) and wind run (7 hours duration x 25 m/sec average wind speed), the total amount of dust leaving the continent in a south-easterly direction could have been two million tonnes.

If this dust contained 0.25 per cent nitrogen, then 5000 tonnes of organic nitrogen could be lost from the system. When compared with the nitrogen left behind, this is not a great loss to individual farmers. However, if that nitrogen had been used to produce wheat, it represents a loss to the whole industry of $4.2 million. Coincidentally this loss is similar to that which occurred the previous year across the same area.

Pasture seeds can also be lost from the eroded paddocks. This will affect pasture production and associated wool growth of sheep grazing these pastures.

In other cases the seed losses can improve pastures by selectively removing grass seeds and leaving behind the buried clover burr. This generally results in a good clover dominant pasture, but if the clover seed bank is insufficient,
weed species, particularly capeweed, can dominate. In 1994, the below average rains in the central south coast discouraged a good clover seed set, so there is a low probability of clover dominated pastures. Capeweed pastures will make these paddocks vulnerable to wind erosion in the next summer and autumn.

**The sanguine side to the erosion**

The rains that have followed the erosion may reduce the risk of further damage this season. Sufficient soil moisture has enabled most farmers to begin a cropping program. In establishing a crop, it is imperative to minimise soil disturbance because there is no ground cover to protect worked-up soil. Zero tillage is recommended for all soils because it is the best solution to soil erosion control, but the cost of machinery and doubts concerning yield depressions still constrain the widespread use of this technique.

Canola stubbles were conspicuous for their stability against these recent winds and this has
prompted farmers to increase the area sown to canola. Its profitability and the erosion protection offered by the stubbles, make it an attractive alternative crop. However, canola is vulnerable to sandblasting for a considerable time after germination. Seeding into eroded paddocks, where there is very little or no stubble to protect seedlings, is hazardous. Very little moving sand is required to damage the seedling. It may be advisable to sow cereals that are far more tolerant of sandblasting.

The extent and severity of the erosion were reduced by good management in some areas and by good luck through rainfall distribution in others. The Jerramungup and Esperance regions were destocked very early in the failed growing season of 1994 and farmers should be congratulated for doing so. Without such action the current situation could have been much worse.

Some areas, particularly the western portion, had not experienced such erosion for 17 years. The storm has clearly demonstrated the need for better pasture and grazing management to reduce vulnerability to such events.

**Preventing wind erosion**

There are several strategies that should be emphasised in the total control of wind erosion other than maintenance of ground covers, which still is the primary control mechanism. Other strategies to be considered are as follows.

The first, and most obvious, is the establishment of a network of windbreaks to protect the most vulnerable paddocks. This is a good insurance policy against the type of season and storms recently experienced. Technical information is available on the alignment, spacings, species, establishment and protection of these windbreaks. The only ingredient missing is sufficient financial incentive to get full protection over the farm. This could be considered as a community responsibility and governments could act accordingly if these wind erosion episodes are to be curtailed.

Whole farm pasture and grazing management needs much more refinement, both in a tactical and strategic sense. Farmers are willing to quit some stock when the seasons are poor. The stock retained are for breeding requirements only, but they are still run and handfed on deteriorated pastures.

The use of feedlots to maintain this much-reduced level of stock should be encouraged so that a minimum proportion of the farm is denuded of critical ground cover. The constraints to feedlotting are
the cost of full maintenance feeding, health problems and the high level of management required.

Department of Agriculture scientists Mike Grimm and Mike Hyder are promoting feed budgeting which is emerging as another tool to prevent wind erosion. In this system it is possible to run the entire flock on a reduced area of the farm during the spring flush.

The area will depend on the seasonal growth conditions. This then allows the remaining pastures to grow to their maximum dry matter production for most of the growing season. The flock can then be set-stocked back onto the ungrazed area during the summer-autumn erosion-prone period, because the high reserves will prevent wind erosion. The management requires the intensively grazed area to be maintained at a constant amount of ‘feed-on-offer’ (FOO), dependent on the objectives of animal requirements (either maintenance or growth).

The FOO is controlled by adjusting stock numbers in the intensively grazed area, with the stock being moved in and out of the area as appropriate. A trial in the South Stirlings district has shown that areas of intensive spring grazing do not blow as long as the post spring grazing management is controlled.

In this trial, intensive spring grazing plots were set-stocked when pastures stopped growing at the end of spring, and then destocked when FOO reached 800 kg/ha in mid February. The stock were then relocated on the ungrazed areas that had accumulated 6000 kg/ha during the spring.

Peter Doyle, now with the Victorian Department of Agriculture, and Dan Carter have assessed the deterioration and depletion of dry pastures over summer and autumn. The results of that work suggest that sheep, at normal stocking rates, would not be able to deplete the cover from the extensive area in six months. Therefore it would not be susceptible to erosion.

This system also improves the stability of the pasture and soil because the intensively grazed area becomes clover dominant. The clover is prostrate, has strong and thick branches and buries many more seed. This creates a strong soil surface of roots and burr, not easily detached by sheep during the grazing period. However, sheep must be removed before they start digging for burr, probably when 800 kg/ha of pasture residue remains.

The system relies on insect and disease control to produce sufficient pasture so that set stocking can be maintained on the ungrazed areas from about January to early August the following year. The area that is intensively grazed needs to be rotated between paddocks from year to year. The system also requires good fertiliser management to maintain the clover and grass composition that sets up the soil stability. The grazing management may not be valid for medic pastures or waterlogged areas. It certainly works well on medium and light textured soils of the medium to high rainfall woolbelt country.

Wind erosion control strategies are reliant on flexibility in sheep management. This was compromised in certain parts of the south coast because of poor rains in 1994 that left numerous paddocks without stock water. Consequently, on some farms, sheep had to get water by crossing through unstable paddocks thus adding to the erosion problem.
One enterprising farmer developed a system to pump water from one dam to another, thus allowing sheep access to better paddocks. However, he was not equipped to service enough customers to make the impact that was required and many paddocks were left without water. In the future the Farm Water Supply Scheme could be used to improve paddock supply to avoid the situation occurring again.

Dan Carter and Rob Hetherington from the Department’s Albany office, have been investigating the effects of adding clay to non-wetting soils. One benefit is that the soil surface structure is improved. In all cases where 100 t/ha clay had been incorporated into the top 50 mm of a water repellent sand the gale force winds experienced in May failed to move the soil because of the improved soil structure. The clay aggregated the sand into particles too large to be moved by the wind. This also overcomes the water repellency of the soil further improving its resistance to wind erosion.

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