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# PASTURE – CORNER-STONE OF SOIL CONSERVATION

By W. J. BURDASS, District Soil Conservation Adviser, Katanning

LEGUME PASTURE is the basis of prosperity in farming in the agricultural areas of Western Australia. The livestock industry could not thrive without it and it also maintains fertility and soil structure for the cereal growing industry. It is, in fact, the corner-stone on which the soil conservation conscious farmer rests his soil management.

A vigorous stand of legume based pasture—

- provides high quality fodder for stock,
- builds fertility and soil structure, and
- protects the soil from erosion.

## Pasture as a soil protector

Soil with a dense, actively growing pasture is almost immune to erosion because the top growth prevents rain-drops coming into direct contact with the soil. The force of the falling raindrop, which will dislodge soil particles on bare ground, is dissipated by the cushioning

effect of the foliage. The roots and runners, both above and below the soil surface, also bind the soil and with the foliage make a carpet on which the water can flow.

The cover afforded by pasture also protects soil from wind erosion.

In sharp contrast to the paddock under good pasture is the fallow, or newly seeded paddock. Here, apart from possible residues left from previous crop or pasture, the soil has no protective cover and is not bound together. Its resistance to erosion largely depends on the soil structure and the surface roughness, perhaps aided by contour cultivation.



Pasture is a soil builder. The good structure on the left is the result of three years under lupins—the area on the right had grown oats continuously for that time



The structure of a soil, and indirectly the surface roughness left by cultivation, reflect its previous treatment.

Here again pasture has a beneficial effect, because it promotes the aggregation of soil particles into a stable crumb structure. In general terms the longer a soil is under pasture the better will be the crumb structure when it is finally broken up for cropping. However, the first few years of pasture give the fastest rate of build-up.

Under cultivation the process is reversed and on most soils the structure tends to decline with succeeding years of crop. With the decline in structure, there is a corresponding increase in the ease with which the soil can be removed by the forces of erosion.

Legume pastures fix considerable quantities of nitrogen which become available to succeeding crops. Again this helps conservation, by promoting rapid growth in the subsequent crop, thus keeping to a minimum the time when the soil is unprotected by vegetation.

It is fashionable to run down annual ryegrass as a pasture species in the cropping areas because it competes with the sown crop. While it is a problem in this respect, one should not lose sight of the fact that annual ryegrass is a valuable pasture species. It is particularly useful on certain heavy soils, such as the grey moort soils around Ongerup, where it frequently gives a protective cover to the soil which the less hardy legumes are unable to provide. As with other pasture species, its foliage protects the surface and its root system improves the structure.

Unlike legumes, ryegrass does not "fix" nitrogen in the soil, but growing vigorous ryegrass pastures on heavy "problem" soils makes them easier to work by improving the soil structure.

Good pasture is a most valuable asset for soil protection. Poor pasture is better than bare soil, but does not build up or protect the soil as well as good pasture does. Poor and patchy pasture is often the result of faulty establishment methods.

#### **Prevention of erosion in depressions and waterways**

Pasture has special significance in drainage lines and waterways. These are

Good pasture establishment and wise pasture use are both good soil conservation and good farming practice.

Vigorous pasture, particularly legume-based pasture, is an excellent protection against soil erosion. Because of its ability to improve soil structure and soil fertility, pasture contributes to soil stability even in the years when crop follows pasture.

It is vitally important to maintain pasture cover on natural depressions and waterways, especially in the years when a paddock is cropped.

Even pasture has its limitations. A paddock ostensibly under pasture will erode if establishment is poor, if pasture is over-grazed, and especially if the paddock is clover harvested.

Management should aim at

- getting a quick, even establishment
- maintaining a vigorous growth
- maintaining stocking rates below a level at which severe denudation and erosion can occur
- taking due precautions when clover harvesting is practised

the areas most prone to erode unless kept, as they should be, under permanent pasture.

Natural depressions that run water should never be touched with a plough or other implement, although many people still cultivate them.

The reclamation of such areas, once eroded, is often a slow and expensive operation, involving the filling in and smoothing over of the eroded area, the construction of diversion or spreader banks and the establishment of pasture.

If it is not practical to protect smaller depressions in this way, contour banks should be constructed to convey run-off to the major pastured depressions.

In new land development it is important that natural depressions likely to run water are established to pasture as early



in development as possible. This would normally be in the first year of crop following the initial clearing.

To get a quick cover on such areas the normal seed rate should be doubled to 18 to 20 lb. of subterranean clover, preferably with  $\frac{1}{2}$  to 1 lb. of Wimmera ryegrass. The clover seed should, as usual, be inoculated and lime pelleted. Super should be applied liberally and should include the appropriate trace elements.

### **Limitations of pasture**

Pasture has its limitations in preventing erosion and will not always protect the soil where large volumes of water flow at high velocities. For this reason creeks and major drainage lines should not be cleared of their natural vegetation when virgin country is being opened up. It is important that the natural cover be maintained on these areas, even if this means fencing them off to exclude stock.

### **Overgrazing leads to erosion**

Overgrazing of a pasture paddock can, and often does, lead to erosion. The biggest danger is from wind erosion, although summer thunderstorms or heavy opening rains can cause devastation on sloping country.

Sheep can find a living from burr even when a paddock is so denuded of cover that there is serious risk of erosion. It is therefore important, particularly where wind erosion is a constant threat, to restrict grazing pressure to a level which will ensure sufficient vegetation cover is left to protect the soil in late summer and at the break of the season.

It may be necessary to protect areas vulnerable to erosion, such as waterways, from overgrazing by fencing stock out.

### **Stock pads a hazard**

Erosion can also occur in pasture paddocks where stock pads form leading down-slope to a watering point. To combat

this type of erosion, watering points should be sited as high in the paddock as possible. Where the source of water must be sited low down in a paddock such as a dam sited low to ensure it is filled, it may be necessary to fence the source and pump water to a higher point to control erosion caused by stock pads.

A cheaper remedy might be to erect "lightning" baffle fences at right angles to the slope in front of the dam which will make the stock deviate on the contour on their way to water, thus breaking the rush of water down the pads.

### **Clover harvesting—a real danger**

In some areas clover harvesting is an important enterprise. While harvesting the seed is necessary the method of harvesting creates a severe erosion hazard. Not only is the top growth of the pasture removed but the ground is pulverised and left in a highly vulnerable state to the forces of wind erosion.

Below are three suggestions for reducing the risk of erosion following clover harvesting. While each one should help on its own, a combination of methods one and three, or two and three is recommended.

- Strip-harvesting, leaving unharvested strips running at right angles to the prevailing wind.
- Windrowing of top-growth, again with the windrows at right angles to the prevailing wind.

Burning of top growth may be cheaper and in some situations may be the only possible method of handling the top growth, but it can only increase the erosion hazard.
- Scarifying immediately after harvesting. This is considered the most important control measure of the three. The object here is to roughen the surface as soon as possible after harvesting.



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