10. HORSHAM LAND-SYSTEM

The so-called black soils have given the Wimmera a reputation for being one of the most productive sections of the Australian wheat belt. Part of the area covered by these soils lies within the area of survey and has been mapped as the Horsham land-system. It occurs along the northern boundary to the east and west of Horsham and has an area of 101 square miles. The features of the land-system and their relationships to each other are summarized in the land-system diagram under Figure 14.

The land-system is composed entirely of the flat plain land-form and is part of the extensive plain in western and north-western Victoria that was formerly under the Tertiary Murray Sea. Plio-Pleistocene fluviatile clays form a veneer over Miocene and Pliocene marine clays and marls.

The distinctive feature of this mapping unit, separating it from the surrounding land-systems, is its soils. The boundary of the gilgaied grey soils of heavy texture marks the boundary of the lard-system. These soils have been given other names such as Wimmera black soils, chernozem-like soils and black earths. Mostly they are dominant over the red-brown earths as shown on the wheat farms by the dark grey fallows with scattered patches of reddish soil. The distribution of these two groups of soil seems to be at random and investigation is needed to find an explanation.

The grey clays exhibit the self-mulching feature in which the soil breaks up into very small aggregates as it dries out. This process is a result of the large amounts of calcium carbonate and it is encouraged by cultivation. The red-brown earths do not self-mulch but rather tend to form a surface seal which cultivation must break.

In their virgin state, the grey clays are gilgaied and the puff has a higher content of calcium carbonate and a greater capacity for self-mulching than the shelf. However, after many years of cultivation and levelling, the gilgais have disappeared from the paddocks as the puff material has been spread over the ground surface so that the self-mulching ability of the grey clays is uniform throughout the paddocks.

There is little native vegetation remaining because the arable farming has led to an almost total clearance of vegetation. It is therefore difficult to decide what were the structure and floristics of the original community, but a savannah woodland of buloke is most likely. The timber still standing is mainly a woodland of black box which is confined to small areas, each of a few acres, where no attempt has been made to grow wheat because of the intractable clay soils. Around Vectis rail siding, small rises of buloke are still uncleared because their gilgaied clays are also unsuitable for wheat growing.

Horsham land-system is the only land-system in the survey area where wheat growing is more important than other forms of primary production. The climate, soil and topography have combined to make this tract of land highly suitable for wheat farming.

The gilgaied grey soils of heavy texture generally give higher yields of wheat than the other groups of soils in the Victorian wheat belt. In Chapter Five, the chemical and physical properties of the soils in this group were indicated. However, two of the main problems of land-use in the land-system are associated with these soils. These problems are a decline in the levels of soil nitrogen, and a weakening of soil structure, and they are a result of an intensive cropping programme which for many years involved a two-year rotation of wheat-fallow.

The decline in soil nitrogen has lowered the quality of the grain, as measured by the protein content. Moss et al. (1960) have stated that, taken as a long-term average, the protein content of the wheat grown around Horsham has dropped to 8.5 per cent. The flour from this wheat often has been of comparatively low baking quality (Moss 1958).

The second problem of the wheat soils, a loss of soil structure, is also caused by a loss of organic matter and by excessive cultivation. This has led to an erosion hazard on the fallows where strong winds can raise dust storms.

The inclusion of a leguminous pasture in the rotation can help to overcome these problems and there is now an increasing change to a three-year rotation of wheat-barrel medic-fallow. The results so far have shown that this is nearer to the correct system of wheat farming in this type of country.

There are some advantages to be gained from such a rotation. Wheat yields increase as do the levels of nitrogen in the soil and protein in the grain, and there is a consequent improvement in the baking quality of the flour (Sims, Rooney and Tuohey 1964). Soil structure is improved by an increase in organic matter and a decrease in the number of cultivations, and the erosion hazard is thereby reduced. Furthermore, the farmer is encouraged to diversify his source of income by carrying more sheep and receiving a bigger wool clip, both in total yield and in yield per sheep.

Barrel medic is used in preference to subterranean clover because it gives superior growth in the alkaline soils, although the Clare strain of subterranean clover is favoured by some authorities as a second choice to the medic. The first sowing of barrel medic is at the rate of 2 lb. per acre with the sowing of the wheat. Subsequently the species will regenerate successfully if it seeds well at the end of its first year. A light subsequent sowing may be necessary if the regeneration is poor.

The introduction of a leguminous pasture into the rotation has raised the question of whether or not a medic-ley system of wheat culture, similar to the clover-ley system at Rutherglen in north-eastern Victoria, can be used in the Wimmera where the average annual rainfall is four or more inches lower. This raises some problems. How many successive years of barrel medic pasture give the best results in terms of grain yield and protein content? Is the usual long fallow still necessary or can fallowing be delayed until two or three months before sowing is due to begin? Current research in the Wimmera should give definite answers to these questions so that the greatest advantage can be gained from the use of the legume pasture.

At the present time, the usual practice is to have only one year of medic pasture. Experience has shown that two or more successive years of medic pasture produce a tall, flaggy crop with too much foliage and not enough grain. This problem is accentuated if the spring rains are insufficient to support the greater bulk of vegetative growth that the higher amounts of nitrogen produce.

Experimental work has shown that the rainfall is too low to dispense with the long fallow of about nine or ten months duration. This period of rest without weed growth is still needed after the barrel medic pasture to conserve moisture for the ensuing crop, (see “Cereal Investigations in the Wimmera, 1963” Department of Agriculture, Vic).

A further cultural treatment, which applies particularly to the grey clays, is the addition of zinc to the soil as zinc sulphate at 7 lb. per acre every seven to ten years. Wheat yields show significant increases although there are no symptoms of zinc deficiency in the crop.

A recent development near Drung Drung is the establishment of irrigation dairy farms in the Horsham Soldier Settlement Area. These farms supply whole milk to the Horsham market. Perennial pastures are grown successfully and the main species are perennial rye grass, irrigation white clover and strawberry clover. Lucerne is grown for grazing and haymaking. The border-check method of flood irrigation is used and one problem receiving attention s the technique of watering in relation to the behaviour of he grey, self-mulching clays. When excessively wet these soils are too sticky to be worked and when dry, they develop an intensive cracking pattern which may lead to over-watering in the summer.

Land-Units

The land-system is developed into the Horsham and Riverside land-units.

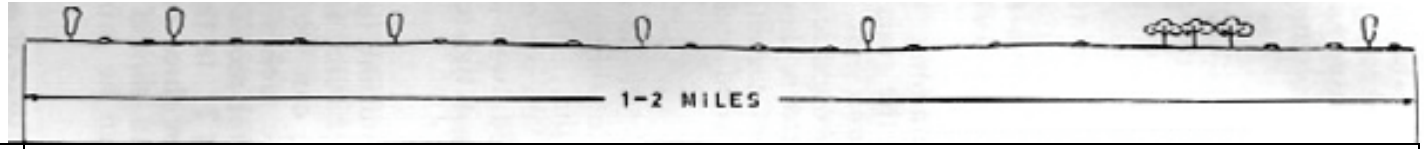
The ***Horsham land-unit*** is the larger of the two and it occupies all the land-system to the west of Horsham and also parts of the parishes of Bungalally, Drung-Drung and Golton-Golton to the south-east of Horsham.

The following features distinguish it from the Riverside land-unit. Its soils are mainly gilgaied grey soils of heavy texture and there are also small patches of red-brown earths. The black box flats with their heavy, unworkable clays are very few. The topography has very long and gentle slopes with gradients that are more definite than those in the other land-unit. The locality known as St. Helens Plains, which has a reputation for the high yields and good quality of its, wheat, is. situated in the south-eastern part of the land-unit.

The ***Riverside land-unit*** is east of Horsham and immediately south of the Wimmera River.

It differs from the Horsham land-unit in the following ways. The red-brown earths are more common and sometimes share an equal distribution with the grey self-mulching clays. Most of the small areas with black box and heavy clays are within its boundary. Lastly, the topography is flatter and suitable for irrigation, a feature used to advantage by the irrigation scheme for the Horsham Soldier Settlement Area.

HORSHAM LAND-SYSTEM



Climate	Average annual rainfall 17½ - 18½ inches : growing season May to September or October	
Land-form	Flat plain	
Geology	Plio-Pleistocene fluviatile and estuarine sediments (mainly clays) overlying Miocene marine clays and marls	
Topography	Flat and up to one per cent slopes	
Soil	Gilgaied grey soils of heavy texture (dominant), red-brown earth (sub-dominant)	
Land-Class	One (fairly intensive cropping without measures to control erosion)	
Land Use	Present	Wheat growing with two and three-year rotations
	Problems	To raise the levels of soil nitrogen and grain protein and to improve soil structure. To determine a new rotation which includes barrel medic to best advantage.
Wind Erosion	Hazard	None under crop and pasture, moderate on the fallows
	Actual	In dry years, topsoil is blown from over-worked fallows
Native Vegetation	Structure	Remnants of what was originally a savannah woodland
	Species	Buloke Black Box

Figure 14 – Horsham Land System