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SOD CULTURE
A System of Orchard Soil Management

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SOD cultivation, or the growing of fruit trees under grass, has gained considerable prominence overseas in recent years. Some success has been achieved in citrus orchards, and to a limited extent the system has been applied to stone fruits, particularly English plums. However its main application has been in growing apples and pears.

In discussing sod culture, it should be understood that we are dealing with a system developed in countries with climatic conditions rather different from our own. These differences include a more even spread of rainfall throughout the year and a lower evaporation rate during the summer months. It is often assumed that the total rainfall is higher in the fruit-growing districts of England where this system was developed and where it is now practised to the virtual exclusion of all others. However the average annual rainfall in these areas varies between 20 and 40 inches which is actually less than that normally recorded in fruit growing districts in this State. Sod cultivation is also practised in the United States and New Zealand but is by no means general in those countries.

ENGLISH EXPERIENCE

Under English conditions, grassing down is usually carried out three years after planting, that is when the trees have become established and are in a position to recover from the shock inherent in grassing down. A sod may be obtained by allowing a volunteer cover to develop, but the resulting swards are seldom good. Sowing after careful seedbed preparation is therefore more popular. S23 ryegrass is usually used and white clover may be included but due to the frequent heavy applications of nitrogen necessary to maintain growth of trees and sward the clover soon dies out.

S50 Timothy is becoming more popular as an orchard grass since it grows at an even rate throughout the year, while ryegrass tends to make most of its annual growth during the spring and early summer when the trees' water requirements are at their highest.

Once the grass cover is established its growth is closely controlled by mowing. If allowed to grow at will, competition for moisture and nutrients can prove detrimental to the growth and cropping of the trees. The grass is cut as short as a lawn using a rotary scythe such as the Hayter, or a gang mower (which is merely a set of three large lawn mowers drawn by a tractor). The ordinary haymower does not cut close enough. Mowing is carried out as often as once a fortnight when the grass is growing vigorously and all mowings are left in situ. This results in reduced moisture loss for the soil, provides a thin mulch and returns nutrients absorbed by the grass to the soil. Sod culture under English conditions may be likened to the growing of a lawn between the trees and not to the cultivation of a pasture.

Overseas, heavy annual applications of nitrogenous fertilisers are necessary to maintain growth of both trees and grass and in England six to eight hundredweights of sulphate of ammonia or nitrochalk are normal yearly dressings. Successful management is only attained by
careful attention to detail and any deviation from the system of management enumerated tends to restrict tree growth and cropping.

**SOME PROS AND CONS**

Bearing in mind local climatic conditions, it may be worthwhile considering some of the advantages and disadvantages of a permanent sward. The advantages lie mainly in improved soil conditions while the disadvantages are chiefly economic. Sod culture reduces fluctuations in soil temperature, which is important since many bacteria are killed at temperatures in excess of 107°F and this figure is frequently exceeded in the surface layers of our soils during the summer months. Aeration and soil structure are improved by the marked increase in the amount of root material in the soil as compared with normal cover crop and clean cultivation methods. This provides conditions under which useful bacteria flourish and in fact there may be three times as many soil bacteria under grass as in a soil subject to clean cultivation. Furthermore rye-grass the commonest orchard sward in England, contributes in the vicinity of five tons per acre per annum to the organic matter content of the soil, which is also beneficial for the growth and multiplication of beneficial soil micro-organisms. Recent research has shown that nematodes tend to decrease as organic matter increases, and this is brought about in part by the development of fungi under these conditions, which attack and consume them.

Cover crops are generally conceded to maintain the organic matter status of the soil but not increase it, due to the destructive action of cultivation. In this respect a permanent grass cover compares very favourably as a source of organic matter.

The effects of drought on trees in sward are somewhat paradoxical. During the first one or two years after grassing down, trees show the effects of moisture stress more than those in clean cultivated orchards as one might expect, but from the third year onwards trees in grass appear to suffer less from drought than those under clean cultivation, and indeed American workers have found more moisture under sod than under clean cultivation. They also showed that the penetration of water was increased. Light rainfall is therefore more likely to reach the tree roots, particularly as under grass there is an extensive feeder root system close to the surface which is not present when clean cultivation is practised.

Soil erosion, which may be serious under cultivated conditions, is completely prevented.

The rapid penetration of water also enables machinery to be used in the orchard sooner after rain and with less damage to soil structure.

Two minor advantages claimed for sod culture are an improvement in colour of the fruit and lengthening of its storage life. However it must be remembered that this refers to orchards under grass. Where a legume is used the effect is likely to be quite different.

In considering the application of sod culture to Western Australian conditions the main essential is ample water supply to tide the sward and trees over the summer period. At the same time irrigation is essential to guard against fire damage. Furrow irrigation is not practicable in a permanent sward, which means that costly installation of a sprinkler system is necessary.

Furthermore the necessary mowing equipment is expensive, a gang mower costing approximately twice as much as a set of disc harrows, but a rotary scythe is probably slightly less costly both to purchase and maintain. In addition mowing must be carried out more frequently than cultivation. Another disadvantage which must be considered is the effective cover provided for certain insect pests such as Curculio beetle necessitating more exacting control measures.

Although sod culture provides undoubtedly advantages as regards soil management, in the absence of local experience all that can be said is that its application to Western Australian conditions is likely to be limited. Subterranean clover as a semi-permanent cover crop is being tried and it seems possible that this may give some of the advantages of a permanent sward without the attendant disadvantages.
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