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FRUIT growers intending to plant an orchard on sloping land, would be well advised to consider the suitability of the block for planting on a contour system.

Contour planting is ideally suited to moderate slopes where the directions and degree of fall are reasonably uniform. If a block naturally lends itself to a contour system, many advantages can be obtained with very little inconvenience or change in the normal management programme.

In this article, the benefits of contour planting are discussed together with the main requirements for a contour layout.

**Principles of Contour Planting**

When an orchard is planted on a contour system, the tree lines are pegged out on a slight grade across the slope of the hill. These lines will curve around the hill relative to the natural contour.

The distance between the contour rows is kept as near as possible to a 20-foot spacing. There will be some variation, depending on changes in the steepness of the slope. Rows up and down the slope may curve or can be kept in straight lines. The distance between the trees along the contour row is normally 18 to 20 feet, although this can be reduced.

As far as possible all the main cultural operations are carried out across the slope in the direction of the contour rows. If some up and down cultivation is attempted, it should be followed by a last working across the slope.

Special provisions can also be made for directing surface run-off during the winter into a grassed waterway usually located at one end of the planting. For instance, small plough furrows are often opened across the slope between the tree rows. Soil is thrown on the downhill side to form small banks.

A carefully constructed diversion or grade bank is often provided above the planting. With large plantings one or more additional banks at selected intervals down the slope may also be worthwhile.

**Advantages of Planting "On the Contour"**

The main benefit that can be obtained from planting on a contour system is:

- Greatly reduced soil erosion. Downhill surface run-off is controlled. This is most important following heavy rains in the autumn and early winter.

Other advantages are:

- Greater retention and absorption of rains of a more moderate nature and particularly of late winter rains.
- All spraying and cultivation, or mowing, is carried out on a gentle grade.
- With sprinkler irrigation, downhill surface run-off is again controlled. Pipes can also be laid out on an even grade so that a fairly uniform pressure is maintained along sprinkler lines.
- With improved surface drainage, many localised wet areas can be avoided.
Contour Planting and Soil Erosion

The problem of soil erosion in orchards in the south-west of Western Australia is more serious than is sometimes realised. Very heavy falls of rain are often experienced during the early winter months. On sloping land, considerable surface run-off is unavoidable and there is then a high risk of losing valuable topsoil. The danger is increased by the fact that the soils of many of our orchards have very little surface grass cover at this time of the year, especially when the land has been cultivated over the summer months. This texture or nature of many of the soils is also such that it washes very easily. The greatest risk of soil erosion is usually found in a new orchard site which has been ploughed or ripped in preparation for planting.

Many quite serious examples of orchard erosion have been seen in hillside plantings in the South-West. In some instances the formation of small gullies has been very noticeable. In addition to the loss of topsoil, considerable filling has later been necessary. Less noticeable but equally serious is the gradual removal of topsoil by water moving over the soil surface. This type of erosion is known as “sheet erosion.” Unchecked it continues over the years, gradually lowering the soil level in the orchard and depositing the soil in drains, creeks and along fence lines.

The loss of topsoil in an orchard is serious because topsoil is the most fertile part of the land. A gradual lowering of the soil surface also means that cultivation implements are more likely to damage tree roots.

Contour planting can help considerably in reducing the problem of soil erosion in orchards. The small ridges, left when cultivation is carried out on a slight grade across the slope, help restrict the amount of run-off and reduce the
Severe soil erosion in an orchard following heavy rains early in winter when the risk of erosion is greatest. This is preventable and with contour planting and careful soil management much valuable topsoil can be saved.

The speed of water moving over the soil surface. Contour banks and furrows provide added protection against downhill movement of water and safely divert surplus run-off to the waterway provided. A large grade bank above the main planting will often prevent large quantities of water moving down into the orchard. When these precautions are taken, much of the risk of movement and loss of valuable top soil disappears.

The final effectiveness of a contour layout will depend on the methods of soil management and, where practicable, on the placement and renewal of contour banks and furrows. The latter applies more particularly in a newly-established orchard.

Requirements for a Contour Layout

Contour planting is ideally suited to moderate slopes. With steep slopes, a tendency for terracing becomes very pronounced. Such slopes are of course also unsuitable for a normal square or diamond planting. This means that very steep
slopes should not be planted to orchard if other suitable land is available. With very gentle slopes, there is little to be gained from a contour planting.

The direction and degree of fall should also be reasonably uniform. If there are too many “dips” or “turns” the benefits may then tend to be outweighed by the inconvenience caused to general orchard operations. This will depend on the particular situation.

The other main requirement for a contour system to operate effectively is the provision of a suitable waterway, usually at one or both ends of the planting. The waterway provides the means of disposing of surplus water drained off the block by cultivation ridges, and by contour furrows and banks. Suitable areas for waterways are adjoining pasture land and natural drainage hollows.

An overall assessment of the suitability of a block for a contour planting is best made by an accurate, on the spot survey. Officers of the Department of Agriculture are available to assist with this work.

Short Rows Sometimes Necessary

When an orchard is pegged out on a contour system, the rows may tend to spread out in places where the slope is more gentle and come together where the slope is steeper than average. This means that it is sometimes necessary to include a short row if the distance between the trees becomes too wide or to discontinue a row if the distance becomes too narrow.

If the slope is a reasonably uniform one, it will usually only be necessary to include one or two short rows in a medium sized planting.

Contour Furrows

Contour furrows to a depth of 6 to 12 in. provide an excellent means of controlling the downhill movement of water. They are a safeguard against very heavy falls of rain early in the winter and have their greatest value during the early years of establishment of a young orchard. In addition to reducing the risk of soil erosion, contour furrows will help eliminate “wet spots” in the orchard. Contour furrows should only be used if and when a suitable waterway is provided.

Over-cultivation should be Avoided

Maximum benefits from contour planting in a clean cultivated orchard will therefore be obtained if the number of cultivations is reduced to a minimum to cope with summer weeds and are also made as shallow as possible.

As an alternative to clean cultivation, a system of mowing can be considered.

Terracing

Where clean cultivation is practised, some terracing is inevitable. This is a result of the gradual downhill movement of soil by cultivation implements. With moderate slopes, however, terracing should
not become developed enough to present any serious problems. At the same time, this is one more reason why cultivation should be kept to a minimum. Some degree of terracing provides an added means of reducing the amount of surface run-off.

Land Preparation Prior to Planting

Precautions in land preparation prior to planting an orchard on a contour system will help considerably in reducing the risk of soil erosion in the first year.

The safest method commences with the land being worked late the previous winter, attention being paid to deep ploughing and ripping as required. The contour rows can then be marked out at a convenient time during the summer. A final cultivation “on the contour” can then be made in mid to late summer in anticipation of the opening rains.

A good grass cover should also be encouraged by applying a dressing of superphosphate and sowing down sub-clover as soon as possible.

For an area being developed as a waterway, annual rye grass can be sown in conjunction with subterranean clover. A supplementary top-dressing of a nitrogenous fertiliser will also increase the amount of surface “cover” in the first year.

Where a suitable waterway is already available, it is possible to make use of contour furrows to remove excess run-off which may result from heavy, early winter rains. Some levelling of smaller bumps and depressions prior to marking out the contour rows will help make the task of contouring much easier.

Contouring and Close Planting

It is important to remember here that maximum benefits from a contour planting can only be obtained if all cultural operations are carried out in the one direction. Once this system is followed, distances of less than 20 feet can be considered for the spacing of trees along the contour rows. Furthermore, it is no longer necessary to keep trees in fairly even lines up and down the slope. Spacings of 20 ft. x 15 ft. or 20 ft. x 16 ft. have so far proved popular with growers who have already combined contouring with a system of close planting.

The Final Decision

When deciding whether a block is suitable for planting on a contour system, the many advantages should be considered along with the possible disadvantages. Every orchard site is different and must be treated on its own merits.

Advice on the suitability of a block for contouring and assistance in planning and layout can be obtained by contacting the Department of Agriculture.
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