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# MECHANICAL PRUNING OF WINE GRAPES

## 4. TYPES OF MECHANICAL PRUNING MACHINES AND TRELLISING SYSTEMS

There are a variety of brands and types of mechanical pruning apparatus available: from models which are mounted on tractors, to those which fit in the harvesting chamber of a mechanical harvester.

### 4.1 Which pruning actions can be mechanised?

- Pre-pruning and box pruning can be completely mechanised.
- Spur pruning with spurs of uniform length can however not be done mechanically.
- Guyot or long bearer pruning, Cazenave and Sylvoz can also not be mechanised.

### 4.2 Various types of mechanical pruning machines are currently available

- There are the horizontal cutting barrel pruners (Figs. 1 and 2) which are actually pre-pruning machines. After this pre-pruning action final pruning must still be done by hand.
- Then there is the lucerne cutting blade type (Fig. 3) which works on the Pitman action which is used for so-called box pruning or pre-pruning.
- Circular saw blade pruning machines exist which are also used for box pruning and pre-pruning.
- European suppliers nowadays have so-called precision pruning machines which follow the cordon with cameras and can virtually execute a final pruning action.
- Where labour is available and it is not too expensive, hand pruning cleaning up actions can be executed after mechanical pruning actions.
- Some of these machines can only prune the top and one side of the cordon at a time and must then prune the other side of the row as well. New machines now hang over the row, completing all the actions at once, by pruning the top and both sides at the same time. This leads to significant savings in costs.
- A disadvantage of South African conditions is the fact that our traditional viticultural areas such as the Western Cape receive winter rain. This equipment together with the weight of the tractor leads to soil compaction if driven over wet soils. Where this equipment is linked to a mechanical harvester, the soil compaction takes place in the middle of the row, which is not so detrimental to the roots of the vines. Where ordinary tractor and multipurpose mechanical harvesters are used simultaneously on the same vineyards, the soil is compacted in the middle of the row and at the foot of the vines. In such cases, soil profile inspection will ascertain whether the soil must be loosened after the harvest to decrease the soil compaction.



Figure 1: Horizontal cutting barrel pruner. (Photo: Pellenc website <http://www.pellenc.com/agriculture/en/Tailleuse-TRP.aspx>)



Figure 2: Horizontal cutting barrel pruner machines. (Photo: Binger Seilzug website <http://www.binger-seilzug.de/index.php?id=89>)



Figure 3: Horizontal and vertical lucerne type pruner. (Photo: Orchard Suppliers website <http://www.agrimex.co.za/index.php/our-brands/ledgard/heavy-duty-pruner>)

### 4.3 Trellis systems:

- All forms of hedge trellising systems, with canopy wires attached directly to the trellising post, can be pruned with horizontal cutting barrel pruning machines. They have the added advantage that shoots which grow through the canopy wires will all be cut into short lengths, which then fall on the berm below the vine where it will later rot and the organic material will contribute to increased carbon levels. This action also eliminates the use of vine cane chopping machines which has a high maintenance cost and is a very time consuming action.
- Perold trellises with any form of horizontal fixed cross bars which support the canopy wires and keep them open, are problematic with horizontal cutting barrel pruning machines. Pruning equipment with horizontal actions which cut between the canopy wires and have in and out movements around the trellis poles can however be used in such cases.
- The Italian system consists of a cordon wire 1.2 m above ground on which the vine is developed in one direction. To stabilise the cordon so that the mass of the canopy and bunches does not cause the vine to twist and sag, it is recommended that during the green shoot development of the vine, two green shoots are intertwined as future cordons around the cordon wire. With local experience, where the vines were planted one metre apart and were developed with a one-directional cordon, the one vine's green shoot was twined over the neighbouring vine's green shoot cordon. This action doubles the cordon length per hectare, which leads to higher production. As the cordon arms thickened, the two stabilise one another and prevent the vines from twisting and sagging due to the mass of grapes. When summer shoots start to hang over, leading to densification, the canopy is sometimes limited by a horizontal topping action above the ground during the growth season, so that air movement can take place to decrease the disease pressure and to facilitate weed control.
- In Italy in the past, use was also made of spiral cordon wires to prevent twisting and sagging. The fact that the vine is a creeper ensures that the green shoot which is twisted on the horizontal cordon wire grows with this spiral. Thus it also becomes a labour-saving mechanism. This spiral wire can be twisted from no. 8 anchor wire around a 65 mm pipe with the help of a lathe and can then be expanded in the vineyard row with the help of a tractor.
- To make provision for the greater mass of grapes, especially in the higher production areas, use can also be made of double oval cordon wires. This type of trellis system can easily be pruned with the lucerne cutting blade as well as circular sawblades. In both cases hand cleaning afterwards is optional.
- In very windy areas, a canopy wire can be strung about 150 mm above the cordon wire to support the canopy and thus prevent twisting and collapse of the vines.

- Trellis systems for mechanisation must be stronger than conventional trellising systems. Trellis posts must be about 75-100 mm in diameter. It is also advisable to use thicker anchor posts than usual – 100-125 mm – which are also planted deeper in the ground. It is advisable to slant the anchor posts at an angle of at least 35° to the outside so that the heavier load does not cause the posts to lean to the inside and so that tractor wheels are not damaged by the heads of the Y-anchor stakes. To prevent lost time with the turning at the ends of rows, it is better to plant rows which are as long as possible. Longer anchor posts must be considered in such situations. Distances between trellis posts must be shorter (about 6 m apart) to handle the greater production load. Staples which can be extracted can damage the bladder presses in the cellar and must be avoided. Preferably holes must be drilled in the poles, through which the wires must be threaded. Alternatively, wires can be fixed with staples and when switching to mechanisation, they can be fixed to the pole with thinner binding wire to prevent the staples from being extracted. Longer staples are better than the usual short wire staples.

#### **4.4 Conclusion:**

- Simple single or double wire vertical hedge trellises without horizontal cross bars are very suited to mechanical pruning actions.
- Trellis construction must be more robust than normal – thicker poles and thicker (or double) cordon wires must be used.
- Where Perold trellising is converted for mechanical barrel pruning, the cross bars must be removed.