

# **ORCHARD PLANNING AND SOIL PREPARATION FOR QUALITY OLIVE FARMING**

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The time of planting olive trees on low potential soils that have proved to be uneconomical for other crops, has passed. Like for all other tree crops, economy demand, regular high crops of good quality olives for survival in a very competitive market. Unfortunately, too many growers are still under the false impression that olive trees prefer poorer soils and can be planted without proper planning, soil preparation, sub optimum irrigation systems and almost no management. Quality becomes more and more important and proper planning, site selection and soil preparation are the keys to success.

## **ORCHARD PLANNING AND SITE SELECTION**

Optimizing production and quality of any fruit type necessitate the selection of the ideal terroir and especially so when size, colour, internal quality and organoleptic properties are at stake. In the past far too little attention was given to this aspect as far as olives are concerned and therefore very little written information exists. The discussion below will be far from adequate but, will at least form a base to work from.

Aspect plays a major role in olive production. In the Western Cape of South Africa the north and northwestern slopes are hot with big variations in temperature, usually poorer soil conditions and subject to strong northwesterly winds. Oil quality is normally poor on these slopes while table olives will battle to get good size. Varieties with low chilling requirements and tolerance to harsh conditions should be planted on these slopes. Select more vigorous varieties for the hot slopes. Southern slopes are cooler but with much more southeasterly winds and are not suitable to vigorous, alternate bearing varieties. High chilling requirement varieties like Sevillano may benefit on these slopes. It is probably more suitable for table olives. Eastern slopes are most probably the best suited to olive growing here in the Western Cape. These slopes usually give the best terroir for chilling, growing degree hours and low stress units.

Wind is essential for pollination but can also cause poor fruit set, floral abortion, fruitlet drop, fruit shrivel, windmarks, sandblasting and wind rocking of young trees. It is therefore imperative to select varieties less prone to wind like Mission when such conditions exist and/or to seriously consider planting windbreaks to optimize the crop and quality.

Frost is also a major consideration when selecting the terroir for olives. Select sites where temperatures will not drop below 10°C. Select more frost hardy varieties like Mission when the terroir has a potential for frost rather than the sensitive Manzanilla variety.

Soil variation should without doubt be taken into consideration. Use more vigorous upright varieties on poorer soils and less vigorous varieties on the better soils.

Kalamata also crop best on better soil with good buffer capacity i.e. good water holding capacity, high cation exchange capacity and without potential waterlogging. Irrigation blocks should also be laid out according to soil types. A proper soil investigation is most important prior to any planning and should form the base of farm planning, cultivar selection and tree spacing.

Intercepting light is fundamental in fruit farming. Olive trees should be orientated north south for best results (between 30° east to 30° west of true north). When trees will remain free standing, not touching each other in the row, row orientation is not important. When the orientation is selected also consider drainage down the row (minimum slope 3-5%), the wind directions and for mechanical purposes try not to have the slope in the row direction steeper than 16% although short distances of 20-25% can be tolerated (danger for tractor drivers, etc).

Distance from the infrastructure and the water source should also be considered. Rather plant oil olives or varieties resistant to bruising furthest away from the processing area and the more sensitive types closer to the facilities. It might also be feasible to plant the early varieties like Manzanilla, Barouni, etc, furthest from the water source due to cost of pumping irrigation water for a shorter period. Concentrate also on early varieties in case of water shortages.

Site selection is all about common sense, knowing the variety characteristics and your farm and selecting the cultivar most suited for each terroir. The perfect match will give pure joy for years on end while a bad choice will keep you fighting problems all the way.

## **SOIL REQUIREMENTS**

|                        |  |
|------------------------|--|
| COLOUR:                | Yellow, Red, Dark, Brown. Bleached colours only for top management   |
| CLAY CONTENT:          | 8-25%. Less than 8% clay only for oil production or top management.  |
| DEPTH:                 | 60cm and more potential root depth. 30-50cm with ridding to reach 60cm.  |
| WATERLOGGING:          | None. Olives are sensitive to waterlogging.<br>If present, drain and/or ridge.   |
| STONE CONTENT:         | 0-60% More than 60% stone content only for medium oil quality. Depends also on size of stone, clay content, area and aspect. Worst condition exists on northwestern aspects (Southern Hemisphere). |
| CRUSTING:              | Zero – slight. If present, correct chemically and/or mulch.  |
| DENSITY/SOIL STRENGTH: | Less than 1.2g/cm <sup>3</sup> and less than 1400kPa soil strength.  |
| pH (KCl):              | 5.0 – 6.0  |
| pH (H <sub>2</sub> O): | 6.0 - 7.0 (8.0 can be tolerated)   |
| SALINITY:              | Absent. Soil EC of less than 1.0mS/m   |

|                                |            |
|--------------------------------|------------|
| P(BRAY II):                    | 20-40mg/kg |
| P(OHLSON):                     | 5-10mg/kg  |
| *K(% of CEC):                  | 3.5-4%     |
| *Ca (% of CEC):                | 70-80%     |
| *Mg (% of CEC):                | 12-15%     |
| Na (% of CEC):                 | <8%        |
| BORON ( Hot H <sub>2</sub> O): | 2-3mg/kg   |
| COPPER:                        | 3-5mg/kg   |
| ZINC:                          | 10mg/kg    |
| MANGANESE:                     | 5-8mg/kg   |

\*To convert % of cation exchange capacity to mg/kg or ppm use the following formula:

%K x CEC x 3.91 (e.g. 3.5 x 6 x 3.91 = 82 ppm)

%Ca x CEC x 2.00 (e.g. 70 x 6 x 2.00 = 840 ppm)

%Mg x CEC x 1.22 (e.g. 15 x 6 x 1.22 = 109 ppm)

NEMATODES: Absent. If present, apply nematicides or fumigate in severe cases.

The above mentioned soil conditions should be created by means of physical preparation, addition of chemical amendments, drainage and reclamation of brack soil prior to planting. The only certain way to achieve this is to have the soil investigated and classified experienced soil scientists and proper chemical analysis done by a reputable laboratory. The soil scientist must submit a full development program containing recommendations on ameliorants, soil preparation and soil management afterwards.

## SOIL PREPARATION

Soil preparation is a specialized and expensive but necessary activity that should precede any new olive planting. The type of soil preparation is determined by the physical and chemical properties of the soil. The physical actions will be determined by the soil scientist after investigation of the soil and soil analysis. The following rules and procedures are normally followed.

- Backfilling and smoothing of the soil must be done first. It entails flattening of contours or ridges, filling up small ditches, flattening high points, removing trees, pipelines, etc.
- Install drainage if pipes must be laid deeper than 1.3m.
- Apply herbicides to kill off weeds and grasses.
- When soil moisture is ideal i.e. at the roll out boundary (when a ball or sausage can be rolled in the hand and explode in many small clods if slight pressure by the thumb is applied), the necessary ameliorants (quantities will be determined by the soil analysis) should be applied. For olives it might be lime, phosphate, potassium, and micro elements (Cu, Zn, B, Mn).

- Disc the soil to mix the ameliorants (chemicals) with the topsoil at the same time creating a loose soil medium which will easily run over the mould board into the subsoil when delve ploughing.
- Subsoil if recommended. Follow the recommended subsoil action. Usually 50-130cm deep with a two third intershank distance. It means that when the effective penetration depth is 100cm, the distance between the tine actions should be 2/3 of the depth i.e. 60-70cm. Always subsoil downhill, which means perpendicular to the contour. If a criss-cross action is recommended, the last action should be downhill with the first action 30-40° to the last one.
- Remove stones if necessary. No traffic is allowed after the final soil preparation action. So it is important to remove as much stone as possible before starting.
- Delve plough with a mixing mould board to the required depth. Direction of ploughing should again be downhill. The slice width must be 2/3 of the effective penetration depth and if two directional ploughing is recommended the last action must be downhill with the first action 30-40° to the last one.
- Always use a flattening device (piece of trainrail, etc) with the last action.
- Peg out the future rows.
- Only then and if necessary controlled traffic is allowed in the middle of future rows to clear stones, install drains, do trellising, irrigation, etc.
- Install drains. Drive on bottom side of drains. Elevate traffic recompaction by subsoiling on the tracks.
- Install irrigation. Sow a proper cover crop to protect the soil against erosion.
- Plant at optimum time. Plant with a watering cart. Make sure of good soil-root contact. Only plant super material.
- Control weeds, insects, diseases, etc.
- Start fertilizing when the trees have established and taken well.
- Schedule irrigation by means of tensiometers or neutron probes, etc. Don't guess!!
- Mulch the trees with rotten straw or any other suitable mulch (pine bark, compost, etc) just before the onset of summer. Always keep a handwidth clear around the trunk.
- Take care of tree training / manipulations to enable the biggest bearing surface as soon as possible.

Proper soil preparation is an expensive action but only a small cost compared to the total development cost. This extra input might set the break even point forward a few months or a year. If not done it will set the break even point forward many years if at all. If you can't do it properly don't enter the quality olive game.

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