

## Olive irrigation in drought conditions

Compared with other crops, olives are quite tolerant to low water availability. In other parts of the world, olive trees are often cultivated under rain fed conditions.

The Australian olive industry has generally developed under irrigation, to ensure commercial production levels. However, some reduction in irrigation volume is often possible with relatively minor impacts on production, and quite large reductions are possible if the major aim is the survival of trees.

### Irrigation Method

Olives may be grown under full or partial cover low-level sprinkler irrigation, or under drip irrigation. Most olive groves in Australia are planted at quite high density, and often to create a hedgerow at maturity. Under these conditions it is important that any partial cover system, either sprinkler or drip, results in a continuous wetted strip along the tree rows, to minimise the accumulation of salt too close to the trees.



### Critical Irrigation Periods

Water requirement for olives in the Riverland is approximately 9.4ML/ha for full production. Water stress can produce major changes in fruit set and fruit drop, fruit growth pattern and final fruit size, fruit ripening and oil content on a dry weight basis.

The following table indicates the major growth stages of the olive, and the impact of water stress on tree growth and fruit development. For oil production, the most critical periods to avoid water stress are fruit set and oil accumulation. For fresh fruit production, fruit set and growth stages 1 & 3 are the most critical.

Olive Growth Stage	Impact of Water Stress
Shoot growth	Reduced shoot growth
Flower bud development	Reduced flower formation
Bloom	Incomplete flowering
Fruit set	Poor fruit set, increased alternate bearing
Fruit growth stage 1 - cell division	Reduced fruit size due to decreased cell division
Fruit growth stage 2 - pit hardening	Minimal impact on fruit size
Fruit growth stage 3 - cell enlargement	Reduced fruit size due to decreased cell expansion
Oil accumulation	Reduced fruit oil content

## **Water Saving Strategies**

Research work conducted in California, Spain, Italy, Israel and other locations has concluded that the most appropriate timing for applying water stress is during pit hardening in the second stage of fruit growth. However, this will provide only minimal water savings.

A general reduction in water over the whole season, while avoiding excessive stress during the critical periods, will be well tolerated by olives. However, fresh fruit production provides less room to move, as any reduction in fruit size will have an impact both on production level and fruit marketability.

When necessary, pruning trees reduces the canopy volume or leaf area index and helps to lower the water requirements of the olive by decreasing the ground cover coefficient.

Severe pruning of trees will also cause a drop in orchard production and during years of plentiful water supply, the trees are no longer the right size to achieve maximum production potential. This drop in production through excess pruning can be avoided by thinning the small shoots in order to reduce the leaf area index rather than by reducing the canopy volume since it takes less time to increase tree foliage than to increase tree size.

## **Water Quality**

Although relatively tolerant to salinity, olive trees are still affected by high salinity levels. Water with conductivity readings above 1800 ECw (1.8dS/m) can be expected to affect tree health and yield, and water with conductivity above 5600 ECw will result in 50% reduction in tree growth and yield.

Even better quality water can lead to salinity problems if leaching is inadequate. To maintain productivity, soil salinity should be kept below 2.7 dS/m. Soil salinity testing should be carried out throughout the season, to monitor salinity build-up in the rootzone.

## **Irrigation Management**

Good irrigation management is based on knowledge of the depth of the rootzone and the water holding capacity of the soil in the rootzone.

A well maintained irrigation system, which applies water efficiently to the rootzone is also required, and the irrigation manager should have a good understanding of the relationship between the application rate of the irrigation system, and the amount of water that needs to be applied to the rootzone at any irrigation event.

Soil water monitoring tools, correctly located and carefully installed, are invaluable tools for good irrigation management.

## Further Reading

Water Budgeting Guidelines - Olive (PIRSA Fact Sheet 11/06)

Seasonal & Weekly Water Budgeting Tools (PIRSA Spreadsheets)

Water Trade Decision Tool (PIRSA Spreadsheet)

[http://www.pir.sa.gov.au/pirsa/drought/irrigation\\_\\_and\\_\\_water\\_management/water\\_budgeting\\_and\\_water\\_trade\\_decision\\_tools](http://www.pir.sa.gov.au/pirsa/drought/irrigation__and__water_management/water_budgeting_and_water_trade_decision_tools)

Monitoring Soil Salinity for Irrigated Horticulture (PIRSA Fact Sheet 31/02/06)

Managing Salinity with Restricted Allocations in the South Australian Riverland (PIRSA Fact Sheet 04/07)

Salinity Impacts of Low Murray River Flows in the South Australian Riverland (PIRSA Fact Sheet 05/07)

[http://www.pir.sa.gov.au/pirsa/drought/irrigation\\_\\_and\\_\\_water\\_management/salinity\\_management](http://www.pir.sa.gov.au/pirsa/drought/irrigation__and__water_management/salinity_management)

Drought Strategy Checklist (PIRSA Fact Sheet 19/06)

Irrigating Horticulture Crops with Reduced Water Supplies (PIRSA Fact Sheet 18/06)

[http://www.pir.sa.gov.au/pirsa/drought/irrigation\\_\\_and\\_\\_water\\_management/irrigated\\_crop\\_information](http://www.pir.sa.gov.au/pirsa/drought/irrigation__and__water_management/irrigated_crop_information)

Business Decision Making Tool (PIRSA Spreadsheet)

[http://www.pir.sa.gov.au/pirsa/drought/irrigation\\_\\_and\\_\\_water\\_management/business\\_decision\\_making\\_tool](http://www.pir.sa.gov.au/pirsa/drought/irrigation__and__water_management/business_decision_making_tool)

Irrigators Toolkit, Latest River Murray Information, Government Assistance and Support

[http://www.pir.sa.gov.au/pirsa/drought/irrigation\\_\\_and\\_\\_water\\_management](http://www.pir.sa.gov.au/pirsa/drought/irrigation__and__water_management)

## Contacts

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South Australian Government Drought Response Initiative

**Drought Link website: [www.service.sa.gov.au/drought.asp](http://www.service.sa.gov.au/drought.asp)**

**Drought Hotline 180 2020 FREECALL\***

(\*Mobile charges may apply. Call back available)

**Last update: November 2007**

**Agdex: 200/561**

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