



SuniTAFE SMART Farm Campus
Crop Trial Fact Sheet

Super High-Density (SHD) Arbosana Olive Trial

SuniTAFE SMART Farm Campus – Cardross, Victoria



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Trial Overview

The SuniTAFE SMART Farm Campus, Cardross, hosts a Super High Density (SHD) hedgerow olive trial established in partnership with Agromillora to demonstrate the viability of highly mechanised olive production systems for the Sunraysia region.

Purpose of the Trial

- Evaluate SHD olive production under local Sunraysia conditions.
- Demonstrate fully mechanised olive growing and harvesting systems.
- Investigate water and nutrient use efficiency.
- Assess the suitability of low-vigour olive cultivars such as Arbosana for intensive production systems.
- Provide a practical demonstration and learning platform for industry and students.

Established: 2016

Industry Partner: Agromillora Australia (Irymple)



Trial Specifications

Specification	Details
Variety	Arbosana
Production System	Super High Density (SHD) Hedgerow
Area	Approximately 0.6 ha
Tree Spacing	1.2 m
Row Spacing	3.3 m
Plant Density	Approx. 2,500 trees/ha
Tree Height	Maintained at 2.5-2.8 m
Irrigation	Dual drip line system
Dripper Type	16 mm UniRAM pressure compensated
Emitter Spacing	60 cm
Application Rate	2.3 L/hr
Harvest Method	Conventional over-the-row wine grape harvester



Trial Performance

The Arbosana variety is recognised internationally for:

- Early production (fruiting in Years 2-3).
- Consistent annual production compared with many traditional olive varieties.
- Suitability for mechanical harvesting.
- Typical mature yields of 8-12 t/ha under commercial SHD production.

SMART Farm Campus Trial Harvest Results

Year	Yield (t/ha)	~ Litres of Olive Oil/Ha
2019	7.78	973
2020	1.51	189
2021	1.27	159
2022	2.87	359
2023	6.67	834
2025	1.75	219

Although yields have been below industry benchmark levels, improvements in canopy management, light penetration, nutrition and irrigation management are expected to significantly improve productivity.

Water Use Efficiency

The SMART Farm trial has averaged approximately:

4.8 ML/ha up to 5.85ML/ha annually

Industry benchmarks for mature SHD Arbosana orchards in low rainfall regions range between **7 and 9.5 ML/ha** to achieve maximum commercial yields.

Water Efficiency Advantages of SHD Systems

- Water delivered directly to the active root zone through dual drip lines.
- Reduced evaporation losses.
- Reduced deep drainage losses.
- Localised root development improves irrigation precision.
- Compatible with automated soil moisture monitoring.

Critical Irrigation Periods

1. Flowering and fruit set (September-November)
2. Fruit growth (December-February)
3. Oil accumulation (March-April)

Soil Characteristics

The SHD olive block is established on:

- Sandy loam through to
- Light sandy clay loam & Clay loam soils

Topsoil depth: 55-70 cm

These soils provide adequate drainage while maintaining sufficient water holding capacity to support precision irrigated olive production.



What is Super High-Density Olive Production?

Super High Density (SHD) olive production is an intensive orchard system where low-vigour olive varieties are planted in narrow hedgerows and managed as a two-dimensional "fruit wall."

Key Features

- More than 1,500-2,500 trees per hectare.
- Continuous hedgerow architecture.
- Fully mechanised pruning.
- Over-the-row harvesting.
- Earlier production than traditional olive orchards.
- Lower harvest labour requirements.
- Greater operational efficiency.

Unlike traditional olive orchards that require trunk shakers, nets and manual labour, SHD orchards can be harvested using modified wine grape harvesters.

Nutrition Management in SHD Olives

Because of the high tree density, nutrition management relies heavily on fertigation and foliar nutrient applications.

Typical Nutrient Requirements

Nitrogen (N)

- Approx. 130 kg/ha/year
- Supports vegetative growth and flower initiation.

Potassium (K₂O)

- Approx. 110 kg/ha/year
- Critical for fruit development and oil production.

Phosphorus (P₂O₅)

- Approx. 30 kg/ha/year
- Supports root growth and flowering.

Boron (B)

- Essential trace element.
- Applied through foliar sprays before flowering to maximise fruit set.

Management Strategies

Fertigation

- Applied through dual drip irrigation lines.
- Small, frequent applications improve nutrient uptake.
- Minimises nutrient leaching.

Foliar Nutrition

- Spring NPK applications support fruit set.
- Post-harvest zinc, boron and low-biuret urea applications replenish nutrient reserves.

Irrigation Management

SHD olives rely on highly precise irrigation scheduling.

Establishment Phase (Years 1-4)

- Approximately 1.5-5.0 ML/ha.
- Frequent irrigation promotes canopy development and hedge establishment.

Mature Production (Year 5+)

- Typical requirement of 7-9.5 ML/ha under full production.
- Irrigation managed to maximise fruit size while maintaining oil quality.

SMART Farm Configuration

- Dual 16 mm UniRAM drip lines.
- Pressure compensated emitters.
- 2.3 L/hr emitter output.
- 60 cm emitter spacing.
- Suitable for automation and soil moisture monitoring.



Recommended Row Direction

For SHD olive production in Australia:

North-South row orientation is generally recommended.

Benefits include:

- Improved light interception throughout the day.
- Better canopy illumination.
- Increased lower canopy productivity.
- Improved fruit quality.
- Reduced shading effects.

Where site constraints prevent North-South orientation, careful pruning becomes even more critical to maintain canopy light penetration.



Pruning Recommendations

Pruning is the key management practice that determines long-term productivity in SHD systems.

Establishment Phase (Years 1-3)

Central Leader Training

- Develop a single main trunk.
- Encourage lateral branch development.

Skirting

- Remove growth below approximately 0.5 metres.
- Provides clearance for harvester catch plates.

Lateral Tipping

- Frequent light mechanical pruning.
- Encourages branching and fruit wood development.

Mature Orchard Management (Year 4+)

Height Control

- Maintain tree height between 2.5 and 2.8 metres.

Width Control

- Restrict hedge width to 0.9 to 1.2 metres.

Top Angled Hedge ("45° Roof")

- Mechanically prune tops at approximately 45 degrees.
- Increase sunlight penetration into lower canopy zones.
- Reduce shading and improve fruiting wood development.

Side Hedging

- Maintain a narrow fruiting wall.
- Facilitate harvester operation.

Lessons Learnt from the SMART Farm Campus Trial

1. Light Penetration is Critical

The most significant factor limiting performance has been canopy shading. Improved pruning techniques that increase light penetration are essential to maximise fruit set and maintain productive lower canopy wood.

2. SHD Requires Active Canopy Management

Trees cannot be allowed to exceed harvesting dimensions:

- Maximum height: 2.8 m
- Maximum width: 1.2 m

Regular mechanical hedging is required.

3. Fertigation Improves Efficiency

Frequent, small nutrient applications provide superior nutrient uptake and minimise losses compared with traditional granular fertiliser programs.

4. Water Management Influences Productivity

Although olives tolerate dry conditions, commercial SHD yields require irrigation scheduling that matches critical growth stages.

5. Existing Vineyard Equipment Can Be Utilised

A significant advantage of SHD olives is the ability to harvest using conventional over-the-row wine grape harvesters, reducing labour costs and improving machine utilisation across multiple crops.

6. Disease Prevention is Essential

Priority diseases include:

- Verticillium Wilt
- Olive Knot
- Anthracnose
- Peacock Spot
- Phytophthora Root Rot

Good irrigation management, sanitation and timely copper applications are important preventative measures.

7. Yield Improvement Opportunities Exist

While trial yields have remained below commercial benchmarks, improvements are expected through:

- Better canopy architecture.
- Increased light penetration.
- Optimised fertigation programs.
- Targeted irrigation scheduling.
- Refined pruning strategies.

Key Takeaway

The SMART Farm Campus SHD Arbosana olive trial has demonstrated that highly mechanised olive production is technically feasible in the Sunraysia region. Success depends on maintaining a narrow, well-lit fruiting wall supported by precision irrigation, fertigation and regular mechanical pruning. With ongoing refinement of management practices, SHD olives offer significant opportunities for reduced labour requirements, improved resource efficiency and increased profitability for modern horticultural enterprises





SuniTAFE SMART Farm
161 Dairtnunk Avenue
Irymple VIC 3498
Telephone: 03 5022 3666

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