Productividad de las plantaciones en la Zona Centro de España

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Consejo Oleícola Internacional
Madrid, 14 de Diciembre de 2011
Olive orchard productivity in the Central Area of Spain

- Central Area of Spain: climate, soil and varieties
- Productivity and quality

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Central Area of Spain

Olive Central Area (Ministry of Agriculture, 1972)
15% total olive orchard in Spain (350,000 ha)
6% production (370,000 t)
Central Area of Spain: climate

Latitude 38.5 – 41.5 °N
High plateau > 400 m
Low temperatures. Average min January < 0 °C
Central Area of Spain: climate

Surrounded by mountains
Annual rainfall < 500 mm, ETo> >1300 mm
High cost of irrigation water
Central Area of Spain: climate and soil

Olives are grown in slopes
Shallow fertile soil
Cornicabra (270.000 ha)
Productive variety in cold areas, poor and dry soils
Oil with high oxidative stability
Sensitive to olive knot, alternate bearing and high FRF
Central Area of Spain: productivity and quality

Orchard characteristics

- Low vigour: shorter growth season and scare water availability
- High orchard density

Cautions

Design: variety and orchard site
Management: irrigation, N, pruning
Central Area of Spain: productivity and quality

Oil characteristics
- Early harvest to avoid frost
- Low Autumn temperatures (<17.5ºC): high oleic and flavour

Average temperature in October
RESEARCH PROJECTS OF THE UNIVERSIDAD POLITÉCNICA DE MADRID (UPM)

- Olive hedgerow design
  - Hedgerow layers – different fruits and oils
  - Maximum productivity and quality
- Irrigation management of hedgerow olive orchard
Hedgerow or superintensive olive orchard

<table>
<thead>
<tr>
<th>Spacing: 12 x 12 (69 trees/ha)</th>
<th>Spacing: 8 x 7 (179 trees/ha)</th>
<th>Spacing: 4 x 1,3 (1923 trees/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFE: 6.933 m²/ha</td>
<td>SFE: 7.588 m²/ha</td>
<td>SFE: <strong>14.999 m²/ha</strong></td>
</tr>
<tr>
<td>Canopy volume: 9.244 m³/ha</td>
<td>Canopy volume: 10.117 m³/ha</td>
<td>Canopy volume: 6.250 m³/ha</td>
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</tbody>
</table>
Hedgerow or superintensive olive orchard

Hedgerow for a harvester machine: modified grapeharvester

Hedgerow height < 3.30 m
Hedgerow width < 1 m
Olive hedgerow in Central Area of Spain
Which size?

Pastor et al.. (2005)

Light determines productivity and quality
Hedgerow layers. Different fruits and oils

Light determines fruit characteristics

Connor (2006), Gómez del Campo et al. (2009), Connor et al. (2009)
Connor et al. (2011)
Hedgerow layers. Different fruits and oils

Light determines oil quality

Gómez del Campo and García (2011)
Which hedgerow size?

Optimal size: Maximum radiation interception and distribution for maximum production and profitability.
Hedgerow design

Maximum production
- Lower layers must be well illuminated
- Several combinations achieve maximum interception, but not same profitability

Maximum profitability
- Narrow hedgerows
- Low hedgerows

Different qualities
- Low illumination – high oleic
- High illumination – high polyphenols and stability
Irrigation management of hedgerow orchards

Deficit irrigation strategies in young orchard (Centro de Olivicultura, 2004-2005)

- Maximum growth was achieved by 68% deficit irrigation (36 and 76 mm, 2nd and 3rd season)
- The low water consumption of young olive trees was due to slow leaf area development

Gómez del Campo (2007) and
Gómez del Campo et al. (2008)
## Irrigation management of hedgerow orchards

**Summer deficit irrigation strategies (La Puebla de Montalbán, 2007-2009)**

<table>
<thead>
<tr>
<th>Month</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
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<tr>
<td>T1</td>
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<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
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<td>100</td>
<td>100</td>
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<tr>
<td>T2</td>
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<td>30</td>
<td>100</td>
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<td>100</td>
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<tr>
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<td>100</td>
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</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>P (mm)</th>
<th>ETo (mm)</th>
<th>Riego (mm)</th>
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<tbody>
<tr>
<td>2007</td>
<td>415</td>
<td>1139</td>
<td>221</td>
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<tr>
<td>2008</td>
<td>365</td>
<td>1219</td>
<td>283</td>
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<td>2009</td>
<td>186</td>
<td>1442</td>
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</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Fruit (kg/ha)</th>
<th>Oil (kg/ha)</th>
<th>Oil (%)</th>
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<tr>
<td>2008</td>
<td></td>
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<tr>
<td>T1</td>
<td>13.913</td>
<td>2503 b</td>
<td>41 b</td>
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<tr>
<td>T2</td>
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<td>1933 c</td>
<td>38 c</td>
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<td>2380 a</td>
<td>46 a</td>
</tr>
<tr>
<td>T4</td>
<td>12.012</td>
<td>2130 ab</td>
<td>41 b</td>
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</tbody>
</table>

### Oil quality

- T3 higher oxidative stability
- T3 higher flavour

Gómez del Campo (2011)
CHALLENGES OF HEDGEROW OLIVE ORCHARDS

- To determine optimal structure
  Radiation threshold values for fruit number and oil synthesis. Row orientations. Varieties
- To determine optimal management.
  Control of structure: varieties, irrigation and nutrition
Muchas gracias

Thank you very much

Muchas gracias