New cultivation trends in Italian tree farming plantations

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The tree farming plantations in Italy have derived its know-how from:

- Industrial plantations
- Intensive poplar plantations
- Fruit tree plantations
First pure plantation with medium stoking density has been realized

- Firstly, a typical spacing of 3x3 m has been adopted
- Secondly, a spacing of 5-6 m has been preferred

Advantages and disadvantages

- Faster soil cover and best weed control
- Best tree selection with thinnings
- Intermediate incomes with thinnings (fuel wood)
- Necessity of extensive cultural practices on a high number of trees (pruning particularly)
- Difficult allocation of felled material into the market

As a matter of fact, the cost of plantation, weed control, pruning and thinning on a large number of trees were not compensated by the products obtained with the thinning.
How to reduce the costs?
Mixed plantations could be a possibility

- Between valuable broadleaved trees some accessory plants have been inserted.

- The use of accessory trees and shrubs have permitted a cost reduction (i.e. pruning) and a better weed control.

In these old plantation types
the position of the trees that would arrive at the end of the rotation (crop trees “principal trees”) will be selected during the cultivation cycle.

This approach has been named

“Postponed Decision Planning”
New plantation types

The position and the spacing of principal trees is predefined (definitive distance) in order to reach the productive goals at optimal distances.

With this method, a couple of trees, 1 m spaced, is planted and the selection of the principal plant between the two is carried out during the qualification phase (5-6 year).

The new approach has been developed owing to the evolution of the pruning techniques.

We call this new type of plantation design “Anticipated Decision Planning”

Why using a definitive spacing and a couple of trees instead of one?

- To improve the quality of stem through early selection
- To reduce management costs
Stem quality improvement

The production of valuable timber is ensured by the progress of the pruning techniques and the choice of the best tree of the couple.

Costs reduction

- The cultural practices are done only on a restricted number of trees
- Pruning costs of a couple are similar in comparison with a single tree.
- Accessory trees do not need any pruning.
- The shrub cover reduces the cost of weed control.
Couple of trees

Juglans regia

Fraxinus angustifolia

Couple of trees

Sorbus torminalis

Pyrus pyraster
Example of plantation design

A further development

The Anticipate Decision Planning technique leads to wide spaced plantations with a consistent loss of productive surface.

Therefore,

within the interlines short rotation trees are planted in order to provide a medium term income for the owners.

the “polycyclical plantations”
“Polycyclical plantations”

Plantations in which are present, at the same time, “principal” trees with different rotations.

A careful attention in plantation design is necessary

The spacing between long rotation principal trees and medium rotation principal trees must be carefully designed in order to avoid negative competition.

In the last experimental plantations the production of timber has been associated with fuelwood production (SRF).
The experimental plots of polycyclical plantations in North Italy have showed interesting results:

- An increase of timber production in comparison with pure plantations (i.e. poplar-walnut plantations vs. pure walnut plantations).
- A diversification of production in terms of assortments and a consequent reduction of hazards due to market price fluctuations.
- An anticipated income from the medium rotation principal trees and from SRF.

<table>
<thead>
<tr>
<th>Farm afforested surface 62 ha</th>
<th>Plantation winter 1998-99: 16 ha</th>
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</thead>
<tbody>
<tr>
<td><strong>Experimental scheme:</strong> randomized blocks</td>
<td><strong>Replications 4</strong></td>
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<tr>
<td><strong>Consociations</strong></td>
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<td>• <strong>V.B.T.</strong></td>
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<tr>
<td>Juglans regia</td>
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<td>Prunus avium</td>
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<td>Fraxinus angustifolia</td>
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<td>• <strong>Poplar clones</strong></td>
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<td>I214 and BL</td>
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<td>P.alba Villafranca</td>
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<td>• <strong>N.F.T.</strong></td>
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<td>Alnus glutinosa</td>
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<td>Elaeagnus umbellata</td>
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<td>• <strong>Shrubs</strong></td>
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<td>Sambucus nigra</td>
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<td>Corylus avellana</td>
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</tbody>
</table>

Example - Casalbuttano plantation (CR)
Plantation design

Why it is important to discriminate between principal and accessory trees?
Because every trees have a specific role

Walnut and Poplar
• Good quality timber

Hazel
• Biomass

Elder and Alder
• Soil cover
• Soil fertility improvement
• Positive modification of walnut trees structure and architecture
• Sheltering of isolated walnuts after poplar felling
The parameters considered in walnut tree plantations grown with / without poplar I214 were:

- **dbh**
- **Total height**
- **Length of net trunk**

### Results

<table>
<thead>
<tr>
<th>Year/Trunk Parameter</th>
<th>Poplar I214</th>
<th>Walnut with I214</th>
<th>Walnut without I214</th>
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</thead>
<tbody>
<tr>
<td>2004 Dbh 6 yr (cm)</td>
<td>30.5</td>
<td>9.0</td>
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<td>2005 Dbh 7 yr (cm)</td>
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<td>2005 net trunk 7 yr (cm)</td>
<td>834</td>
<td>380</td>
<td>328</td>
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</table>
• No significant differences of all parameters (dbh, H and net trunk) were noticed between walnut trees grown with / without poplar

• No significant differences among trees grown in various blocks
**Conclusions**

- Dbh and height increments of walnuts is not reduced by the presence of poplar trees.

- After the poplar trees harvesting, the walnuts continue to grow without suffering the significant lighting increase.

- The walnut real net trunk is slightly higher in walnut/poplar plantations.

- Poplars, thanks to the wide spacing, show higher dbh increments, and thanks to the presence of associated species, do not need any treatment (fertilization, pesticides, irrigation, etc.)
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The spacing of 7 m between walnuts and poplars is:

- Optimal for walnut tree in order to avoid negative competition with poplar tree
- Optimal for poplar tree in order to reach quickly suitable commercial dimensions
And the future....

After the harvesting of hazel and poplar
A new planting

Shade tolerant trees (i.e. Carpinus betulus)

Thank you for the attention

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