

## **The world olive industry – current developments**

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The world olive industry is presently undergoing a marked transformation in order to meet the demands of the 21<sup>st</sup> century. The major changes involve orchard intensification, advanced horticultural methodologies, controlled management and efficient industrial technology. Considerable efforts in many research centres are directed towards the selection and breeding of varieties more suitable for intensive cultivation. Furthermore, optimization, which differs from maximal production, has to be developed, taking into account long term uniformity of fruiting, adaptation to local cultivation potentials and environmental conditions. The main factors which affect optimising production in any orchard involve controlling light interception, pollination, tree vigour, biannual bearing, tree shape for harvesting and post harvest management. In new orchards the choice of cultivars suitable for the specific environmental and growing condition is essential.

The development of intensive orchards involves the development and utilization of new approaches and techniques. Efficient irrigation and fertigation, balanced correctly for each growing region, is of key importance for a high and continuous production of either fruit or oil. Orchard planning has to be an integrated operation based on the growing conditions, the desired intensification, availability of suitable plant material and horticultural technology. Evaluation of training and pruning systems for the intensive orchard for olive oil production reveals the need for continuous mechanisable harvesting.

As the olive has a genetic tendency to develop alternate bearing, reducing the fruit load in high yielding “on” years, is often required to ensure accompanying vegetative growth essential for crop development. Optimisation of orchard performance is dependent on minimizing the alternate bearing tendency, even though in some cases additional horticultural treatments are needed. It has been shown that the combined two year yield on crop controlled trees is higher than the combined yield on uncontrolled trees in two consecutive “on” and “off” years. Furthermore, fruit size which is greatly reduced due to a heavy crop in “on” years will lead to a smaller amount of oil remittance caused by an unfavourable flesh to stone ratio in smaller fruits. The importance of minimizing alternance is imperative if labour and processing capacity is to be utilised efficiently. Reduction of the “on” year peak production allows for a smaller capacity of the processing plant. In extreme cases a fruit thinning treatment can be applied, leading to a smaller number, but larger more efficient oil producing fruits. In intensive irrigated orchards, scaffold girdling, as a regular treatment, has a beneficial effect on regulating cropping. These inputs become more important under marginal climatic conditions, i.e. in years with high non-inductive winter temperatures. In such regions the alternance might be re-induced occasionally and several steps have to be taken to minimize it again after such an event.

The presence of pollinators in the orchard is highly important for optimising the fruiting potential of most cultivars on a regular basis. The response to cross pollination is particularly expressed in regions where temperatures during the flowering period are relatively high. In various cases it was found economical to introduce a pollinator by grafting or if possible by interplanting even in existing large scale single variety orchards. The increased fruit set due to cross pollination was shown most clearly in intensive irrigated orchards with a high fruiting potential based on their level of flowering. Only few cases, such as with cv. Koroneiki, have not shown response to cross pollination.

Tree size and shape effect harvest efficiency and adapting these to the harvesting method used is important for optimizing this expensive activity. For manual harvesting the trees should be kept low and wide to enable easy approach to the various branches to eliminate the use of high and inconvenient ladders. Intensification by irrigation, fertilization or fertigation is only efficient if accompanied by proper and suitable orchard management and cultivars.

Although a limitation of tree height might reduce fruit production, this reduction is economically compensated by the easier and more rapid harvest operation. In mechanically harvested orchard the scaffold number and tree height has to be adjusted in accordance with the harvester to be applied. The efficiency of both scaffold and whole tree vibration or shaking harvesters or overhead harvesters depends on tree form, height, scaffold angle on the trunk and its thickness. The genetic growth tendency of the cultivar has to be considered when the harvesting methods are chosen to avoid excess and continuous pruning, battling the natural shape of the trees.

Growth characteristics, fruiting control and plant protection problems can be controlled by different chemical sprays. However, the use of plant material which is genetically adapted to specific orchard systems and environmental conditions is considerably more efficient and less costly. Resistance to diseases and pests, controlled vigour, fruiting wood development and natural tree form, offer new opportunities for developing different types of intensive orchards, utilizing different approaches to mechanization systems. An integrated approach between genetic properties and horticultural treatments has to be taken in modern industrial olive growing since genetic and molecular control of specific properties in a cultivar is still problematic. One of the aims in the present olive breeding programs in the world is to develop varieties with a genetic controlled tree size and shape suitable for optimal mechanization of the future intensive oil orchards.

April 05