

The imbalanced production of alternate bearing exists across many different fruits, but for avocados the issue is particularly pronounced. At www.freshfruitportal.com we speak with Francisco Mena, agronomist and partner at Chilean consultancy Gama, who discusses the importance of balanced nutrition, pruning and pollination for mitigating the impacts of this phenomenon. 

While the full causes behind biennial bearing in avocados have not yet been defined, the process is believed to be regulated by the hormone pathway, as the effects have been mitigated through the use of a phytohormone growth regulator called gibberellin. Mena explains the natural process can also be induced by weather conditions.

"After a freeze or a spring with very poor conditions for the fruit set, this can trigger a very pronounced alternate bearing cycle," he said.

He explains that in years of high load, the trees are subjected to increased competition, leading to smaller fruit sizes.

"These years are very nutritionally demanding for the tree, and if they don't have the adequate nutrition they can lose vigor and with that a part of their health."

On the other hand, in low fruit load cycles there are is less flowering and fruit, which can lead to excessive growth and shading, prompting the need for more sever pruning to maintain light levels.

He says growers can utilize mitigation management programs for alternate bearing in avocados, while at the same time scientists are searching for solutions at the molecular level.

Mena highlights the Avocado Genome Sequencing Project in Mexico as one possible means to a solution, albeit for the long term.

"If I'm not mistaken it ought to be ready this year. Once it's finalized, we suppose that it will be much easier to know the causes of alternate bearing and the genes that control it.

"Biotechnology applications are not easy in avocados because of the difficulty that has presented itself to date for the in-vitro cultivation of avocado tissue.

"While we don't have solutions coming in the area of biotechnology, we have to keep working on field techniques that allow us to attenuate the problem."

Technical recommendations

"As alternate bearing is a very complex problem, we attack it in several ways," says Mena.

"The use of growth bioregulators has shown to be a very good tool. While it doesn't stop it, this can mitigate the effects in a significant way," he says.

The agronomist emphasizes the importance of managing tree nutrition according to charge and force, applying the right quantities and understanding the phenological times of peak demand when more nutritional support is needed.

"The idea is to stimulate bud development at the right time, for the development of these buds that could potentially have flowers. However, we are not interested in stimulating vegetative development in the time of floral induction as that could work against flowering in the next season."

He adds that good nutritional management includes pruning to keep renewing the materials produced, that if unattended to can cause lower production.

"We have established systems in which the pruning intensity is not very high, as the intensity is directly proportional to the loss in fruit that could be generated. Today we seek to conduct balanced pruning that does not induce large fruit losses."

He emphasizes that the level of biennial bearing is variable. For example, a grower could produce 30 metric tons (MT) per hectare one year, followed by just 12-15MT.

"In this case, while alternate bearing is involved, it's not a great problem for the grower as it deals with a productive range that is very high."

However, if a grower reaches 20MT/ha in a good year and 5MT/ha or less the next, this makes the growers situation complicated.

To measure the incidence of alternate bearing on productivity, growers can use the Alternate Bearing Index (ABI) to define the relation between years of high and low loads. Values closer to one indicate a high level of alternate bearing, while zero indicates a lower variation.

The team at Gama consider an ABI of 0.5 or more to be the most troubling.

Gama's applied research team - mainly financed by a group of growers - have investigated

types doses of growth regulators, with the aim of finding techniques to manage small trees with less pruning requirements, allowing them to potentially grow adequately every spring.

In parallel the group is studying the relation between alternate bearing and pollinators, having worked in conjunction with the University of California and the Hofshi Foundation for the last three years. After the first year dedicated to studying the effects of bees, today the focus is on determining the most effective combinations of pollinators.

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