Session 5A: Almond Orchard Production II

Moderator: Franz Niederholzer, UC Cooperative Extension

#56: Risk of Early Frosts in Almond

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Late frost is in many cold areas the main factor determining the productivity of the almond culture since, in these areas, the frequent annual loss of the yield because of frost is much higher than any other factor. Varietal choice is a fundamental issue in this regard and today there are many possibilities to combat this problem by growing the right varieties in each area. Delay flowering time remains the key factor in addressing this issue, as the variety flowering time primarily determines the risk of yield failure due to frost. Climate change is causing an increase in the frequency of extreme weather events, so it is of interest to investigate into the effect of these phenomena on the loss of yield due to frost. In 2021, the cold snap after the Philomena storm in Spain, between January 11 and 17, which brought temperatures below -30ºC in some regions, has been a clear expression in this regard. In many areas of Castilla-La Mancha region (Spain), these low temperatures affected the flower buds of most of the varieties, except for the extra-late and ultra-late varieties, despite the undeveloped state of the buds. Damaged bud flowers dropped and the yield of this year was lost. In this work, we analyze the consequences that low temperatures can have on bud damage in very early stages of development, depending on the flowering season of the varieties and the depth of the frost.

Keywords: Frost damage, Almond, Dormancy, Flowering time, Varietal election

#30: Characterization of the scion/rootstock interaction effect on the molecular regulation of almond tree architecture

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The emergence of almond (Prunus amygdalus (L.) Batsch, syn P. dulcis (Mill.)) intensive and semi-intensive cropping systems has created a necessity for new almond cultivars with vigor and shape adapted to these new circumstances. Thus, understanding which processes are behind the regulation of the tree three-dimensional structure (or tree architecture), and what factors may play a role, like the scion/rootstock interaction, has acquired relevance recently. Firstly, we have studied the influence of the rootstock genotype in the scion transcriptome, focusing in the mechanisms that control almond tree architecture. Three commercial almond cultivars were grafted onto three hybrid rootstocks, resulting in nine combinations, whose gene expression in shoot tips were analyzed via RNA-Seq. We report differential expression of genes involved in hormonal and molecular responses associated with the regulation of apical dominance, branch formation, plant growth, cell wall formation or nitrogen assimilation. Secondly, if the rootstock genotype is able to alter scion development, it is credible to assume that the scion genotype affects the rootstock performance. Two commercial almond cultivars were grafted onto two hybrid rootstocks, resulting in four combinations, whose transcriptome in both scion and rootstock tissue was analyzed via RNA-Seq, in order to study the effect of the scion/rootstock interaction. We confirmed that the scion genotype has an impact on the rootstock expression profile, affecting the expression of genes associated with hormonal regulation, root development and light signaling. Therefore, the communication between scion and rootstock determines the final tree architecture, highlighting the importance of selecting the correct scion/rootstock combinations when establishing new almond orchards.

Keywords: tree architecture, rootstock, apical dominance, RNAseq, branching

#164: Chill and heat requirements of new almond cultivars of CEBAS-CSIC

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For temperate fruit crops, chill accumulation is the most important factor to break the endodormancy of flower and vegetative buds. After endodormancy release, heat accumulation is the climatic factor that triggers flowering and sprouting. Chilling requirements are specific for each cultivar and they must be fulfilled to ensure a good flowering, tree development and production.

Climate change involve negative effects on the accumulation of chill, mainly due to the increase in temperatures, what may affect phenological development almond cultivars. For this reason, growers