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# METABOLOMICS AND GENETIC OF BUDS DEVELOPMENT IN FICUS CARICA L.: FOR AN EVOLUTION FROM MONOECY TOWARD DIOECY

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The mechanism behind the bud evolution towards breba or main crop in *Ficus carica* L. is uncertain. Anatomical and genetic studies may put a light on the possible similarities/differences between the two types of fruits on the same shoot. For this reason, we collected complementary data from genetic and metabolomic techniques. Two fig varieties (Dottato and Petrelli) and one caprifig genotype were used for the analysis and two types of buds were considered for fruit development: 1) a flower bud for the development of brebas in fig varieties or prifichi in the caprifig; 2) a mixed bud for the development of the main crop (fichi) in the figvarieties or mammoni and/or mamme in the caprifig. The RNA seq together with structural genome annotation allowed the prediction of 34,629 known genes and 938 novel protein-coding genes.

Transcriptome analysis of genes during bud differentiation revealed differentially expressed genes in the three lines analysed, in particular, caprifig showed the highest number of genes expressed in profichi (22.088) compared to brebas of Dottato (21.801) and Petrelli (21.762), while the lowest number in the mammoni (21.031) compared to the two fig varieties (21.852 and 21.441, respectively). Looking at the up and down expressed genes, the three fig samples shared 41 genes up regulated and 23 gene down regulated. Caprifig showed a different expression pattern with respect to

the varieties and among the up and down regulated genes, there were 22 up regulated specific for breba and 21 down regulated unique for main crop.

To better understand the mechanism behind the bud development towards main crop or breba, the buds of the three fig varieties were analysed, also, for metabolomic composition to correlate gene expression with metabolite amount.

Finally, the optical microscope and 3D X-ray tomography were used to highlight differences mainly related to the stage of development. The X-ray images of buds showed a great structural similarity between breba and main crop during the initial stages of development. Analysis at the microscope indicated that inflorescence differentiation of breba was split in two seasons whereas that of main crop started at the end of winter of season 2 and was completed within 2 to 3 months.