

# **Production of high value natural plant products: from the laboratory bench to the drugstore shelf**

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Plants have always been a source of nourishment and care for living beings. Their dual task as producers of nutrients and drugs played a fundamental role in the evolution (and co-evolution) of herbivorous and omnivorous organisms. The so-called secondary (or special) metabolites are molecules with well-defined functional roles. The complexity of the molecular structures produced by plants is only equal to their versatility and biodiversity, while the harmonious interweaving of the biosynthetic and metabolic pathways offers a perfect picture of the adaptive plasticity of plants to changing environmental conditions. In this lecture I will briefly discuss the concepts of biodiversity, sustainability and the functional role of bioactive natural products, exploring the sites of synthesis and accumulation, the strategies adopted by plants to defend themselves from stress and the use of bioactive molecules as food supplements and as a source for natural medicines to combat diseases. After illustrating the main biosynthetic pathways leading to the synthesis of natural products I will focus on plant biotechnology applications for the production of bioactive natural products both *in vivo* and *in vitro*. I will also provide some examples of technology transfer to industrial process and the advantages of experienced laboratories to create competitive spin offs for the production of standardized and highly qualified bioactive natural products for the pharmaceutical and nutraceutical industries.