

Carbon Allocation between Growth and Production in Fruit Trees

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SUMMARY

Carbon allocation within a plant depends on complex rules linking source organs (mainly shoots) and sink organs (mainly roots and fruits). The complexity of these rules comes from both regulations and interactions between various plant processes involving carbon. This paper presents these regulations and interactions, and analyses how agricultural management can influence them. Ecophysiological models of carbon production and allocation are good tools for such analyses. The fundamental bases of these models are first presented, focusing on their underlying processes and concepts. Different approaches are used for modelling carbon economy. They are classified as empirical, teleonomic, source-sink or based on transport and chemical/biochemical conversion concepts. These four approaches are presented with a particular emphasis on the regulations and interactions between organs and between processes. The role of plant architecture in carbon partitioning is also discussed and the interest of coupling plant architecture models with carbon allocation models is highlighted. The link between roots, shoots and reproductive compartments is analysed through a model developed for peach trees, describing carbon transfer within the plant, and based on source-sink and Munch transport theory. On this basis, the consequences of fruit load or plant pruning on fruit and vegetative growth can be evaluated.