

Amino acids are essential compounds for all the living organisms. Along with their central role as constituents of proteins, in plants they also act as precursors of a myriad of compounds and metabolites with critical functions in development, signaling, and responses to the environment, concerning many different aspects of plant biology. Nevertheless, the main bulk of our knowledge about the regulation of amino acid metabolism in plants stills rely on studies performed in bacteria, and many details remain missing or not well understood. In this communication, we provide new insights into the biochemical regulation of the biosynthesis of two different amino acids in plants: arginine and phenylalanine. Both are good examples of how the role of these compounds is not restricted to the biosynthesis of proteins. Hence, arginine is, thanks to its high nitrogen/carbon ratio, one of the preferred forms for the storage of organic nitrogen. This is particularly relevant in the formation of the seed, one of the main reasons of the undisputable, adaptive success of the land plants. On the other hand, the aromatic amino acid phenylalanine is the main precursor for the biosynthesis of phenylpropanoids, a huge array of phenolic compounds that act as pigments, flavors, protectant agents against UV radiation and ROS, structural components of the cell wall, etc., essential for surviving in the land environment. Our findings contribute to gain understanding about how biochemical regulation, mainly through allosteric mechanisms in response to different metabolites, helps to modulate the biosynthesis of these amino acids, maintaining their homeostasis. We also discuss how this regulation has evolved, from primitive algae ancestors, mosses and liverworts, to account for the higher degree of physiological and metabolic complexity of the modern vascular plants.