Plant micro RNAs and the development-defense interface

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A fascinating biological question is how multicellular organisms maintain their homeostasis by coordinating the different cell types of which they are composed. This task is especially daunting for sessile organisms, like plants, that face an ever-changing environment with many sources of stress. Stress induced by pathogens is arguably one of the major challenges to organism homeostasis. Therefore, plants have developed sophisticated molecular mechanisms to perceive and defend themselves from pathogen threats. In order to survive, pathogens produce countermeasures to disassemble host defenses and exploit host cellular pathways for their own benefit. Thus ensues an arms race in between both host and pathogen. As result of that arms race, host cells undergo profound molecular reprogramming (i.e. transcriptional and metabolic changes) that impact both development and defense during infection. In plants, inappropriate activation of defense leads to severe defects in development, growth and fitness. Therefore, host needs to finely control deployment of defense measures in order to minimize adverse effects from this trade-off. Despite that is a long recognized trade-off, the coordination between host genetic programs devoted to control defense and development remains largely unclear.

RNA silencing is both a defense mechanism and a gene regulatory system that orchestrates both plant development and stress responses. Our work focuses on that regulatory mechanism to unveil the interactions and coordination of both development and defense. I will discuss our latest results about how different biotic and abiotic factors affect the host's micro RNA (miRNA, a special class of small RNAs involved in silencing) regulation and the subsequent changes in host reprogramming.