Molecular mechanism of RALF1-FERONIA-EBP1 axis in transcription regulation

With the support by the National Natural Science Foundation of China, the research team led by Prof. Yu Feng (于峰) at Hunan University uncovered the mechanism of how RALF1-FERONIA-EBP1 axis regulates transcriptional events, which was published in *PLOS Biology* (2018, 16(10): e2006340).

The receptor-like kinase (RLK) FERONIA (FER), belonging to the *Cr*RLK1L family, has recently emerged as a potential target for crop improvement and protection because of its versatile, fundamental and tissue-specific roles in plants growth, yield and multiple stress responses. Extracellular rapid alkalinization factor 1 (RALF1, a peptide ligand of FER) binds to FER, increases FER phosphorylation and further modulates varied cellular activities (e. g., cell growth). Several downstream proteins, located at the plasma membrane and/or cytoplasm, have been revealed as the partners of the RALF1/FER pathway in the past decades. However, the mechanisms of how FER regulates nucleus events are still unclear.

Recently, Yu Feng and colleagues revealed that upon RALF1 peptide binding, FER first promotes *ErbB3 binding protein* 1 (*EBP1*) mRNA translation, then interacts with and phosphorylates the EBP1, leading to EBP1 accumulation in the nucleus. Then EBP1 will bind to and regulate the expression of downstream genes (e. g., *CML38*) to negatively regulate the RALF1 signaling. The plant RALF1-FER-EBP1 pathway is reminiscent of animal epidermal growth factor receptor (EGFR) signaling, wherein EGF peptide ligand leads the EGFR receptor to interact with and phosphorylate EBP1, promoting EBP1 nuclear accumulation to modulate cell behaviors. Thus, they suggest that, upon peptide signals binding, plant FER and animal EGFR receptor kinase use the conserved key regulator EBP1 to modulate cell growth in the nucleus.

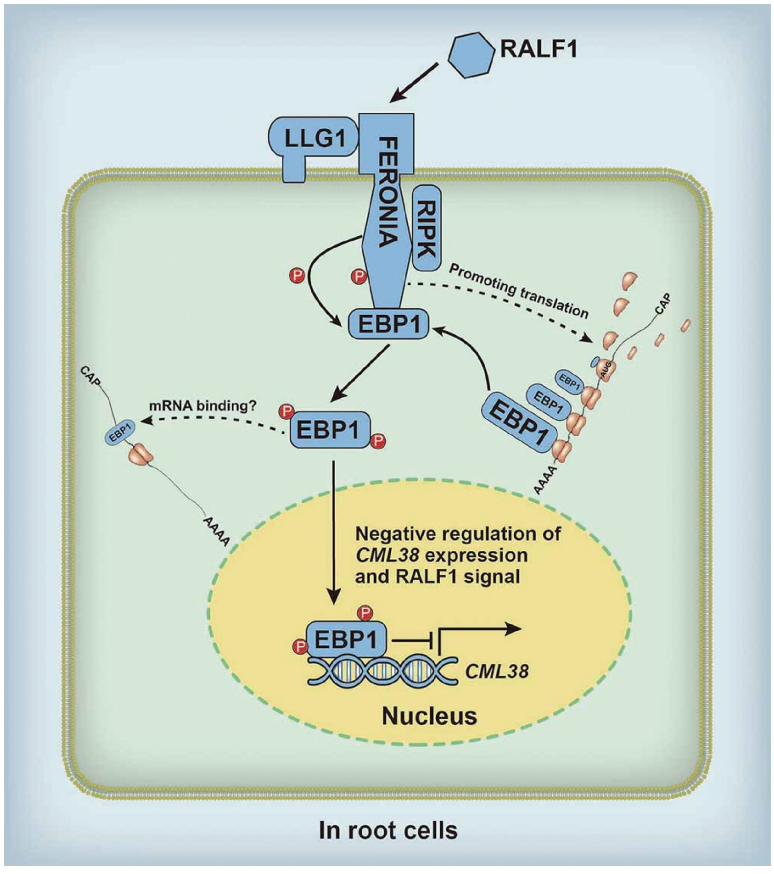

Figure A working model of the RALF1-FER-EBP1 signaling pathway in roots.