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Title:	A system biology approach to discover novel transcriptional regulators that influence the Shoot growth by regulating cytokinin homeostasis in the shoot apical meristem of Arabidopsis thaliana
Authors:	Yadav, Sonal (/jspui/browse?type=author&value=Yadav%2C+Sonal)
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Abstract:	<p>Sonal Yadav PH14010 Thesis Abstract A systems biology approach to discover novel transcriptional regulators that influence the shoot growth by regulating cytokinin signal homeostasis in the shoot apical meristem of Arabidopsis thaliana Abstract: Cytokinin (CK) signalling controls versatile functions in the shoot apical meristem (SAM) of higher plants, such as stem cell niche maintenance, organ patterning and differentiation of stem cells. Despite having comprehensive knowledge of the shoot promoting role of CKs, very little is known about how the spatio-temporal regulation of the genes encoding CK biosynthesis enzymes, degradation enzymes and signalling factors in the shoot apical meristem (SAM) is achieved. I have created the transcriptional reporters to determine the expression pattern of CK genes in the SAM. Next, I have conducted a high-throughput yeast-one-hybrid screen to determine the upstream transcriptional regulators of the shoot specific CK biosynthesis, degradation and signalling genes. Based on the yeast-one-hybrid gene regulatory network, I identified transcription factors that are either activated in response to hormone or abiotic stress and binds to CK signalling gene promoters. NAC062/NAC WITH TRANSMEMBRANE MOTIF1 (NTM1)-LIKE6 (NTL6) binds to the LONELY GUY4 (LOG4) and ARABIDOPSIS HISTIDINE KINASE4 (AHK4). I have observed that CK signalling output is decreased in the stem cell niche of nac062/ntl6 mutant plant SAM, and as a result size of the shoot is also reduced. NAC062/NTL6 is expressed throughout the SAM, and it has a minimal effect on the growth even in the ambient conditions. Cold stress further stimulates NAC062/NTL6 cleavage from the membrane, and thus, enters the nucleus where it activates the transcription of LOG4 and AHK4. The ectopic expression of the constitutively active NAC062/NTL6 resulted in delayed senescence and arrested shoot growth due to increased cytokinin response. In summary, our work revealed an interesting molecular link between NAC062/NTL6 and CK signalling components.</p>
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