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Molecular dissection of flavonoid biosynthetic pathway in a nutraceutical food crop (*Fagopyrum* spp.)

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Buckwheat contains high rutin (a flavonoid) content and due to high nutritional value of the crop it is considered as an important source of functional food. Besides antioxidant properties, rutin strengthens capillaries and, therefore, helps people suffering from arteriosclerosis (the hardening of the arteries) or high blood pressure. Out of 20 known *Fagopyrum* species, *Fagopyrum esculentum* (Common buckwheat) and *F. tataricum* (Tartary buckwheat), are the major sources of rutin. The rutin content increases to 40-50x in mature seeds of *F. tataricum* compared to *F. esculentum*. Understanding the molecular basis of nutritional and seed component differences between tartary and common buckwheat would be helpful in re-engineering their molecular machinery for higher nutritional value. The expression of flavonoid pathway structural genes, through qRT-PCR, in different growth stages (seed germination to seed maturation) vis-a-vis rutin content variation showed differential expression for four genes, PAL, CHS, CHI and FLS with the amounts of transcripts relatively higher in *F. tataricum* compared to *F. esculentum*, thereby, correlating these genes with the biosynthesis and accumulation of rutin. In addition, differential transcript profiling was done to identify genes controlling biosynthesis, modification, transport and accumulation of high rutin content in tartary buckwheat compared to common buckwheat. Differential transcriptional profiling through cDNA-AFLP, in seed maturing stages generated 19.7% differentially expressed transcripts between two species. The TDFs belonged to different biological processes such as basic and secondary metabolism (33%), regulation (18%), signal transduction (14%), transportation (13%), cellular organization (10%), and photosynthesis & energy (4%). Therefore, the up-regulation of TDFs during transition from flowering to seed formation suggests their involvement not only in the higher rutin content of *F. tataricum* over *F. esculentum* but also in other biological processes contributing to overall nutritional and morphological differences in the seeds of both the *Fagopyrum* species. Therefore, present study will be beneficial for utilization of accessions with high rutin content along with metabolic engineering for genetic improvement of *Fagopyrum* species for higher flavonoid (rutin) content.

Biography

Nidhi Gupta has submitted her Ph.D. in Plant Biotechnology at the age of 28 years under the supervision of Dr Rajinder S Chauhan at Jaypee University of Information Technology and seeking an opportunity to carry postdoctoral studies. She has published 3 papers in reputed journals and 4 review articles. She is serving as an editorial board member of an e-book.