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Accumulation of carotenoids and expression of carotenoid biosynthetic genes during maturation in rice grains (*Oryza sativa* L.)

Upasna Chettry and **N K Chrungoo**
North Eastern Hill University, India

Cereal grains are important and rich sources of phytochemicals that have significant effects on human health. With the growing interest in the use of valuable dietary phytochemicals, rice bran has been intensively studied for its biologically active components. Our study investigated the relationship between carotenoid accumulation and expression of carotenoid biosynthetic gene during the developmental stages of seed maturation in rice cultivars varying in their bran color. Transcription levels of the key regulatory genes viz., psy pds lcy and ß ch were higher in rice grain containing colored bran indicating that carotogenesis is an ongoing process in mature bran. The highest level of expression and subsequent carotenoid accumulation was noted in the purple cultivar having 44.30 µg/gm of beta carotene, 25.07 µg/gm of zeaxanthine and 2.304 µg/gm of lutein. With the transition from the milking to the mature stage of grain filling in the purple cultivar, the change from ß, € carotenoid (α-car and lutein) accumulation to ß, ß carotenoid (ß-car, zea, etc) accumulation was observed. On the other hand the brown cultivars showed no detectable level of beta carotene, although 3.14 µg/gm of zeaxanthine and 6.72 µg/gm of lutein were noted. To further analyze the transcription patterns of carotenoid synthesis and metabolism, the bran layer from the purple and brown cultivars were removed. Noticeably, the purple variety showed reduced gene expression with the accumulation 0.1 µg/gm of ß carotene on the other hand, the brown cultivars showed non-detectable level of expression and carotenoid accumulation. Transcriptome profile generated by Ion torrent further gave a better insight into the underlying mechanism that affects enzyme synthesis/activity causing variation in the expression pattern and carotenoid content in the different developmental across the varieties. Thus, our study indicates the potential use of purple rice as a genetic source in rice breeding programs aimed to develop new varieties of rice that have a high content of provitamin A.

Biography

Upasna Chettry is a Junior Research Fellow availing INSPIRE Fellowship in the Department of Botany, North Eastern Hill University, Shillong. She has participated in many national conferences and symposium. She has been awarded Best presentation by PLOS at NGBT Conferences, 2014.

upasna.chettri485@gmail.com

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