



Category: Miscellaneous

Ethylene production and constitutive expression of ethylene receptors and ethylene signal transduction during grain filling in apical and basal spikelets of compact-and lax-panicle rice (*Oryza sativa*) cultivars

Sudhanshu Sekhar¹ and B.P. Shaw²

¹National Rice Research Institute (NRRI), Cuttack, INDIA

²Institute of Life Sciences, Bhubaneswar, INDIA

Presenting author: sudhanshugodda@gmail.com

Abstract

Grain yields in modern super rice cultivars do not always meet the expectations because many spikelets are located on secondary branches in closely packed homogeneous distribution in these plants, and they do not fill properly. The factors limiting grain filling of such spikelets, especially in the lower panicle branches, are elusive. Two long-duration rice cultivars differing in panicle density, Mahalaxmi (compact) and Upahar (lax) were cultivated in an open field plot. Grain filling, ethylene production and constitutive expression of ethylene receptors and ethylene signal transducers in apical and basal spikelets of the panicle were compared during the early post-anthesis stage, which is the most critical period for grain development. In another experiment, a similar assessment was made for the medium-duration cultivars compact-panicle OR-1918 and lax-panicle Lalat. Grain weight of the apical spikelets was always higher than that of the basal spikelets. This gradient of grain weight was wide in the compact-panicle cultivars and narrow in the lax-panicle cultivars. Compared to apical spikelets, the basal spikelets produced more ethylene at anthesis and retained the capacity for post-anthesis expression of ethylene receptors and ethylene signal transducers longer. High ethylene production enhanced the expression of the RSR1 gene, but reduced expression of the GBSS1 gene. Ethylene inhibited the partitioning of assimilates of developing grains resulting in low starch biosynthesis and high accumulation of soluble carbohydrates. It is concluded that an increase in grain/spikelet density in rice panicles reduces apical dominance to the detriment of grain filling by production of ethylene and/or enhanced perception of the ethylene signal. Ethylene could be a second messenger for apical dominance in grain filling. The manipulation of the ethylene signal would possibly improve rice grain yield.

Citation: Sekhar, S. and Shaw, B.P. Ethylene production and constitutive expression of ethylene receptors and ethylene signal transduction during grain filling in apical and basal spikelets of compact-and lax-panicle rice (*Oryza sativa*) cultivars [Abstract]. In: Abstracts of the NGBT conference; Oct 02-04, 2017; Bhubaneswar, Odisha, India: Can J biotech, Volume 1, Special Issue (Supplement), Page 285.
<https://doi.org/10.24870/cjb.2017-a269>