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Size and Activity of Shoot Apical Meristems as Determinants of Floret Number in Rice Panicles

[Chunsheng Mu](#)¹⁾, [Keisuke Nemoto](#)²⁾, [Zongbin You](#)²⁾ and [Junko Yamagishi](#)¹⁾

1) Graduate School of Agricultural and Life Sciences, The University of Tokyo

2) Asian Natural Environmental Science Center, The University of Tokyo

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Abstract: The sink capacity (floret number per unit land area) is currently a serious constraint to grain yield production in *japonica* rice. The size and activity of the early reproductive shoot apex (incipient panicle) are potential determinants of the number of florets generated on the panicle. This hypothesis was tested using eight field-grown *japonica* rice cultivars (IR65598-112-2, IR65564-44-51, Nipponbare, Akenohoshi, Dobashi 1, Koshihikari, Kochihibiki and Nakateshinsenbon). Using morphometric microscopy, we found that the initial size of the reproductive shoot apex was highly correlated with the number of primary branches, but not with the number of florets per primary branch. The cell division activity of the early reproductive apex examined by *in situ* hybridization analyses using the *histone H4* gene probe as a marker for DNA-replicating cells varied with the cultivar. Akenohoshi had twice as many DNA-replicating cells as Nipponbare and the cell division activity was highly correlated with the number of florets per primary branch, but not with the primary branch number. We concluded that the primary branch number was determined by the initial size of the reproductive apex, and that the floret number per primary branch was determined by the cell division activity in the following apex growth. This result provides the first evidence of a relationship between cell division activity and floret formation in the rice panicle.

Keywords: [Floret](#), [Histone H4](#), [Panicle](#), [Primary branch](#), [Rice](#), [Shoot apical meristem](#), [Yield](#)

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