ONLINE ISSN : 1349-1008
PRINT ISSN : 1343-943X

Plant Production Science
Vol. 12 (2009) , No. 3 365-380

[PDF (2630K)] [References]

Performance of a High-Yielding Modern Rice Cultivar Takanari and Several Old and New Cultivars Grown with and without Chemical Fertilizer in a Submerged Paddy Field

Renante D. Taylaran[1)], Satomi Ozawa[1)], Naoko Miyamoto[1)], Taiichiro Ookawa[1)], Takashi Motobayashi[1)] and Tadashi Hirasawa[1)]

1) Graduate School of Agriculture, Tokyo University of Agriculture and Technology

(Received: February 28, 2008)

Abstract: A high nitrogen-uptake capacity and effective use of absorbed nitrogen for dry matter and grain production are required to improve the production cost and environmental pollution. We characterized grain yield, dry matter production and nitrogen accumulation in six rice cultivars: Sekitori (released in 1848) and Aikoku (1882), referred to as SA cultivars hereafter; Koshihikari (1956); Nipponbare (1963) and Asanohikari (1987), referred to as NA cultivars hereafter; and Takanari (in 1990) as a high-yielding modern cultivar. The plants were grown with and without chemical fertilizer in a submerged paddy field. When plants were supplied with manure and chemical fertilizer, Takanari consistently produced the heaviest grain and dry matter, followed by the NA cultivars, and the SA cultivars the lightest. Dry matter production before heading was greater in Takanari and the NA cultivars due to the longer duration of vegetative growth. Dry matter production after heading was greatest in Takanari, with a larger crop growth rate (CGR), and smallest in the SA cultivars with a shorter ripening time. Greater dry matter production during ripening was accompanied by the greater accumulation of nitrogen by Takanari and NA cultivars. These plants developed a larger amount of roots. The smaller light extinction coefficient of the canopy was also attributed to the higher CGR in Takanari. When plants were grown without chemical fertilizer, Takanari also produced heavier grain and dry matter, followed by the NA cultivars. The heavier grain in these cultivars resulted from the greater dry matter production before heading, which was due to the longer period of vegetative growth. The greater dry matter production and nitrogen accumulation by Takanari and NA cultivars were evident when plants were grown with chemical fertilizer. Koshihikari was

characterized by a higher CGR and greater nitrogen accumulation during ripening in the absence of chemical fertilizer which should be noted in efforts to decrease rates of nitrogen application.

Keywords: Dry matter production, Grain yield, Light extinction coefficient, Nitrogen accumulation, Old and new cultivars, Rice, Root length density

To cite this article:

Renante D. Taylaran, Satomi Ozawa, Naoko Miyamoto, Taiichiro Ookawa, Takashi Motobayashi and Tadashi Hirasawa: “Performance of a High-Yielding Modern Rice Cultivar Takanari and Several Old and New Cultivars Grown with and without Chemical Fertilizer in a Submerged Paddy Field”. Plant Production Science, Vol. **12**, pp.365-380 (2009) .

doi:10.1626/pps.12.365

JOI JST.JSTAGE/pps/12.365