RESEARCH PAPER:

Growth parameters and radiation interception as influenced by different environments and plant geometry in rice (*Oryza sativa* L.)

■ANA SHARMA, L.K. DHALIWAL, S.K. SANDHU AND SOM PAL SINGH

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SUMMARY

A field experiment was conducted during *Kharif* season of 2009 at the Research Farm, Punjab Agricultural University, Ludhiana. Two rice cultivars, PAU 201 and PR 116 were transplanted on 15 June and 30 June under two spacings. The leaf area index was higher (2.33) under closer spacing (20 cm x 15 cm) as compared to under wider spacing (30 cm x 10 cm), the LAI of which was 2.26. Significant variations in the dry matter were also reported due to the spacing. The total dry matter was higher in wider spacing as compared to closer spacing throughout the crop growing period in both the varieties. Significant relationships were observed between leaf area index and photosynthetically active radiation. Dry matter accumulation also showed a positive relationship with photosynthetically active radiation.

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Key Words :
Rice crop, Leaf area index, Photosynthetically active radiation, Dry matter accumulation

Author for Correspondence -

ANA SHARMA
Department of Agricultural Meteorology, Punjab Agricultural University, LUDHIANA (PUNJAB) INDIA

See end of the paper for **Coopted authors**

Rice (*Oryza sativa* L.) is the staple food for more than 60 per cent of the world population (Anonymous, 2008) and plays a vital role in the national food security. Rice occupies about 23.3 per cent of gross cropped area of the country and contributed 43 per cent of total food grain and 46 per cent of total cereal production. Rice is cultivated on 44.8 million hectares with a production of about 87.8 million tons, in India whereas, it occupies an area of 2.80 million hectares in Punjab having highest productivity (4.01 t/ha) in the country (Anonymous, 2011).

Adoption of advanced and modern technology coupled with the favourable climatic factors such as temperature, sunlight and rainfall contributed to higher rice yield. Solar radiation is the energy source that sustains organic life on earth. The biologically significant aspects of solar radiation are the intensity of radiation, spectral distribution and radiation distribution in time. The leaf area index (LAI) and dry matter production are useful indicators of crop productivity and closely related to PAR interception (Pandey *et al.*, 2004). The capture of radiation and its use in dry matter production depends on the fraction of photosynthetically active radiation (PAR) that is intercepted and the efficiency with which it is used for dry matter production (Mavi and Tupper, 2004). The ultimate capacity of a plant to produce dry matter depends on the degree of exploitation of solar radiation. Efficiency of conversion of radiation into dry matter depends upon plant traits and environmental conditions (Hundal *et al.*, 2004). In addition to the above discussed factors, plant geometry also affects the plant growth, dry matter production and yield by altering microclimate.

EXPERIMENTAL METHODOLOGY

The experiment was conducted at the Research Farm, Punjab Agricultural University, Ludhiana (30°54'N latitude and 75°48'E longitude and is 247 meter above mean sea level) during *Kharif* 2009. Two varieties of rice *viz.*, PR 116 and PAU 201 were transplanted on two different dates *viz.*, 15 June and 30 June during *Kharif* 2009 under two spacings of 20 cm x 15 cm and 30 cm x 10 cm. The experiment was replicated thrice in the Randomized Block Design. The package of practices recommended by Punjab