

Effect of plant spacing and transplanting time on phenology, tiller production and yield of rice (*Oryza sativa* L.)

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ABSTRACT

A field experiment was conducted at the Research Farm of Department of Agricultural Meteorology, Punjab Agricultural University, Ludhiana, to study the effect of spacing and transplanting time on phenology, tiller production and yield in rice crop (*Oryza sativa* L.). Two genotypes of rice (PR 116 and PAU 201) were transplanted under two sowing environments (15 June and 30 June) and two plant spacings (20 cm x 15 cm and 30 cm x 10 cm). The number of tillers per plant was more in PAU 201 transplanted on 15 June under plant spacing of 30 cm x 10 cm. The higher quantum of heat units were taken by PR 116 (2957 day°C) under 15 June transplanted crop. The highest yield (43 q/ha) was observed in PAU 201 transplanted on 15 June under 30 cm x 10 cm spacing. The other yield attributes *i.e.* number of effective tillers per square meter, number of effective tillers, test weight, number of grain per panicle and total biomass were more in 15 June transplanted crop as compare to 30 June.

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Key words : Rice crop, Tillers, Heat units, Phenology, Biomass, Yield, Yield attributes

INTRODUCTION

Rice (*Oryza sativa* L.) is grown in all continents of the world due to its wide adaptability to diverse agroclimatic conditions. Rice which is the main staple food crop in India, contributes around 45 per cent of the total production and hence hold the key to sustain food sufficiency in the country (Rai and Kushwaha, 2005). It is the major *Kharif* crop and ranks second after wheat in terms of area, production and productivity in Punjab. An inter-state comparison of productivity of rice over time reveals that Punjab has consistently improved its respective position. Punjab, occupies an area of 2.49 million hectare under rice with production of 8.82 million tons with an average yield of 3545 kg ha⁻¹ (Anonymous, 2002).

Temperature and light together plays a key role in rice production since the light intensity requirement of rice is higher and temperature dependent. Tillering is a varietal character to some extent but the emergence and development of rice is primarily influenced by the meteorological factors such as temperature, sunshine hours and rainfall. Tiller number per unit area is an important attribute of rice yields, which was reported to decide the physical capacity of the yield and contribute to 60 per cent of grain yield variations in rice crop. Further expansion of area under rice crop is very unlikely due to tremendous increase in population and urbanization.

Therefore, the increasing demand of food has to come from increase in productivity per unit area. For achieving this one of the prime requirement and non monetary input is transplanting cultivars at appropriate dimension of time and spacing. The present experiment was, therefore, planned to achieve the target set for sustainable rice production under Punjab conditions.

MATERIALS AND METHODS

A field experiment was conducted at the Research Farm of Department of Agricultural Meteorology, Punjab Agricultural University, Ludhiana (30°54'N, 75°48'E and 247 m above mean sea level) during *Kharif* 2009. The area is characterized by subtropical and semi arid climate. The experiment was laid out in Randomized Block Design and replicated thrice. One month old seedlings of two rice varieties PR 116 and PAU 201 with row-to-row and plant-to-plant spacing was 20 cm and 15 cm in first treatment and it was 30 cm and 10 cm in second treatment were transplanted on 15 and 30 June, respectively. Plant population was 33 hills per square meter in both the treatments. The fertilizers were applied as per the recommendations by Punjab Agricultural University, Ludhiana. Ten plants were tagged in each plot and their numbers of tillers were counted periodically. The phenological stages *i.e.* tillering, booting, heading, flowering, milking, hard dough and physiological maturity

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