

EFFECT OF PLANTING GEOMETRY AND SEEDLING DENSITIES ON LIGHT INTERCEPTION IN RICE CULTIVATION

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Abstracts : The optimum number of seedling densities and spacing, more number of leaves exposed to sunlight which intercepted more light. The wider spacing resulted in profuse tillering and facilitated plant for better utilization of resources, optimum planting geometries is good for growth and utilization of nutrients. It helps in better growth of plants. Higher plant height helps better LI which results in higher absorption of specific wave length of light necessary for photosynthesis that ultimately increased the yield.

Keywords : Effect, Seedling, Cultivation, Rice

INTRODUCTION

Rice is life to a majority of people in Asia. The cultivation of rice represents both a way of life and a means to livelihood. For more than half of humanity, rice is life itself. Life and livelihood without rice is simply unthinkable. This grain has shaped the cultures, diets, livelihoods and economies of most of Asia. Rice is the most important cereal food crop of the world providing major source of the food energy for more than half of the human population. More than 90 per cent of the world's rice is produced and consumed in Asia where it is an integral part of culture and tradition. In world the total production of rice is 463.3 million tonnes (milled basis) in 2011–12 (Anonymous, 2012). Cropping system of a region not only relates to the distribution of area under different crops at a particular time, but it includes also the sequence of crops and intensity of cropping in relation to climate, physiography, soil type, quantity and quality of irrigation water. The potential productivity of a region is largely dependent on the climate of the area. The climatic resource of a region, in turn, affects the technological developments, management strategies as well as agricultural sustainability in general. Wheat and rice are the two major cereal crops in India grown in rabi and kharif seasons, respectively. Several studies have indicated how yield of these crops may be affected by climatic variation. High temperature at the time of sowing of wheat results in a poor stand, poor tillering, attack of root infecting fungi and pests and the early onset of flowering. All these factors depress the yield. India is second largest producer after china and has an area of over 42.2 million hectares and production of 104.32 million tones with productivity of 2372 kg ha⁻¹. Rice occupies a pivotal place in Indian agriculture and it contributes to 15 per cent of annual GDP and provides 43 per cent calorie requirement for more than 70 per cent of Indians. It is accounts for about 42 per cent of total food grain production and 55 per

cent of cereal production in the country Rice is consumed both in urban and rural areas and its consumption is growing due to high-income elasticity of demand. To meet the growing demand, a rapid increase in paddy production is needed. But, there is little scope to increase the area; hence increase in production and productivity with an improvement in efficiency of production act as a technological breakthrough to meet the growing demand. With using the appropriate method of planting geometries and seedling densities the farmers can increase their yield without increasing input cost and get higher profit.

Effect of planting geometry, seedling density, transplanting time on light interception

Guilani *et al.* (2002) suggested that flowering behavior or photoperiod sensitivity is an independent factor and has no correlation with yield, 1000 grain weight and sterility percentage. Leaf area index remained constant and the light transmittance of canopy, photosynthetic rate and water use efficiency of the 9th to 13th leaves increased, while the transpiration rate of the leaf and the identical degree of heading decreased under lower density than that of higher density (Lin *et al.*, 2005). Whereas Light interception of crop canopy at 30 and 60 DAT was worked out by observing light intensity. Irrespective of the treatments, light interception was the highest 10 days aged seedlings than that of 14 days aged seedlings. (Verma, 2009).

The effect of increasing temperature on rice potential production is generally negative. It decreases photosynthesis, increases respiration, shortens the vegetative and grain filling period. It has been estimated that grain yield of rice decreases by 400 kg/ha, if the temperature increases by 10C in day and night time, and slightly less than 300 kg/ha when mainly night temperature increases by 10C (Penning de Vries *et al.*, 1993). However Chowdhary and Wardlaw (1978) suggested that grain size in rice is much more stable at high temperatures than wheat.

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Though the highest and lowest temperatures occur for a short duration, yet their occurrence above or below optimum value greatly influence the plant activity (Sands et al., 1979).

Crop productivity is determined by above-ground total dry matter (ATDM) accumulation (areal total dry biomass) along with its partitioning to various parts of plants (Van der werf, 1996). ATDM and crop growth rates (CGR) are dependent on the ability of the crop canopy to (a) either the interception of photo synthetically active radiation (IPAR) (Bisco & Gallagher, 1977) which is function of leaf area index (LAI) and crop canopy architecture or (b) conversion of IPAR to ATDM, i.e., radiation use efficiency (RUE) (Sinclair & Muchow, 1999). Similarly Optimum time of transplanting is important in achieving the maximum yield potential of a variety. Xie *et al* (1996) observed that yield and total biomass of rice decreased as sowing was delayed. Munda *et al* (1994) obtained higher grain yield of rice (Khonorulla and PK-1-3) by transplanting on 15th June as compared with 1st July. Roy *et al* (1994) found a rice variety which was more sensitive to photoperiod but good temperature tolerant. They recommended BR-11 for early while BR-22 and BR-23 for late sowing. Whereas Gangwar and Sharma (1997) obtained maximum grain yield by transplanting on 1st to 16th July compared to 31st July and 16th August. The most serious yield limiting factor associated with early transplanted crop is sterility. Stake and Yoshida (1978) observed that spikelet sterility is induced by high temperature.

CONCLUSION

Generally, scented rice varieties having low tillering, less number of effective tillers, low responsive to high nutrient dose. Therefore, it is need plants are planted in optimum time with recommended number of seedlings in a proper spacing through which the plants intercept proper light and grow healthier, its ultimately help in getting higher yield as well as good quality of grain.

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