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# Weed suppression ability of rice genotypes under low-input condition in Chhattisgarh

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## ABSTRACT

**Eastern part of India the state Chhattisgarh receives higher rainfall which favours the growth of weeds particularly in upland rice ecosystem and limits the yields due to increased rice weed competition for nutrients and light. Weeds are major constraints to upland rice production in Chhattisgarh. The objectives of this investigation were to study difference in weed suppression ability among upland rice cultivars and to determine the morpho-physiological traits involved. Twelve contrasting cultivars of *oryza sativa* were selected to form a range of distinctly different plant types in terms of growth duration cultivated in two seasons. Significant differences between cultivars were observed in weed biomass at 90 DAT in both the years indicating differences in their competitive ability. Weed biomass was negatively correlated with plant height, plant shoot biomass, photosynthesis, leaf area, LAI, CGR and RGR. Rice genotype Safri-17, Vasumati and Dubraj were most competitive against weeds. In general, the difference in grain yield in hand weeding twice and weedy check were remarkably higher in most of the rice genotypes. However, the lowest difference in grain yield was observed in Safri-17 followed by Dubraj and Vasumati during both years.**

**Key words :** Genotypes competitiveness, Rice, Morpho-physiological traits, Weed suppression.

## INTRODUCTION

The state Chhattisgarh is the eastern part of India, is relatively underdeveloped with regards to agricultural productivity as compared to most of the Indian states. The state is spread in 13.51 million hectares area with a cultivable land of 5.88 million ha. The productivity of rice in state is 1.55 t ha, which is far behind from the productivity level of India 3.03 t ha, (Anonymous, 2007). Weeds are constant constraints to rice production and cause yield losses in all rice production systems and in all seasons (Zoschke, 1990).

Apart from direct weed management interventions, weed growth is also determined by the physical and chemical interference between plants of the same or different species in the field. Plant interference can be divided into competition (the unequal sharing of resources such as nutrition, light and water) and allelopathy (the direct regulation of the growth of one plant as a response to chemicals released from another). Several authors found that tall rice (*Oryza sativa* L.) cultivars with high tillering ability, high leaf number, high leaf area index (LAI), high shoot biomass, high root biomass and long and lose leaves are more competitive than those of short structure, fewer tillers, short and eract leaves (Fischer *et al.*,1995 and Fofana and Rauber, 2000). Therefore, an attempt was made to study the plant height, no. of tillers, no. of leaves, shoot biomass, photosynthesis, leaf area (LA), leaf area index (LAI), crop growth rate (CGR), relative growth rate (RGR) and associated weed biomass.

## MATERIALS AND METHODS

Two identical field experiments were conducted in 2006 and 2007 at the Instructional Farm of Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.). Twelve *Oryza sativa* genotypes were selected to form a range of distinctly different plant type in terms of growth duration and morpho-physiological traits. The trials were conducted in wet season (June-November), with rainfall during the rice-growing period of 945 mm in 2006 and 1310 mm in 2007. The experiments were conducted under irrigated conditions. The genotypes were grown with two levels of weeding; weedy check and hand weeding twice. The design was a factorial randomized block, with two replications. Sampling of morpho-physiological traits on rice were carried out at 30, 60 and 90 DAT. Plant height, tiller number, leaf number and shoot biomass were recorded in each plot on three different hills randomly selected plants and its average value was used for analysis. The leaf photosynthesis rate (umol $CO_2$ $m^{-2}s^{-1}$) and transpiration rate (mmol $H_2O$ $m^{-2}$ $s^{-1}$ ) were measured on fully developed leaf from top at flowering stage using portable photosynthesis system (IRGA) model (LI-COR-6400.USA). The leaf area index (LAI), crop growth rate (CGR) and relative growth rate (RGR) were used to determine as described by (Yosida *et al.*, 1976). At 30,60 and 90 DAT of rice, weeds were uprooted in a sampling area of 1m and principal species and total weed biomass were determined. At maturity, the grain yield was obtained from net plot area. Simple correlation analysis was used

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