

## Influence of temperature and sunshine hours on tiller production in lowland rice varieties

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### ABSTRACT

Field investigation was carried out to study the effect of temperature and sunshine hours on tiller production of certain popular lowland rice varieties grown in Andhra Pradesh. These experiments were carried out at the Agricultural Research Institute Farm, Rajendranagar, Hyderabad during *Kharif* and *Rabi* seasons of 1994-95 and *kharif* Season of 1995. The treatments comprised of three dates of planting with three varieties having different durations. Results revealed that increase in temperature during active tillering period over a range of 24.1-27.4 °C, increased the tiller production from 453 to 689 tillers m<sup>2</sup> in the different varieties. Increase in tiller production was gradual and slow over a temperature range of 24.1-26.6°C during active tillering period but thereafter the increase was sharp upto 27.4°C. The sunshine hours that prevailed during active tillering period did not show any significant effect on tiller production.

**Key words :** Lowland rice, Tiller production, Temperature, Sunshine hours

In rice, tillers are one of the main yield components. Tillering, though a varietal character to a certain extent, their emergence and development is primarily influenced by three factors - temperature, sunshine and nitrogen supply. Tiller number per unit field area is an important attribute in rice yields, which was reported to decide the physical capacity of yield, contributing to 60 per cent of grain yield variations in rice (Yoshida and Parao, 1976). With the above background in view the present study was undertaken to assess the impact of weather, particularly temperature and sunshine hours on tiller production.

### MATERIALS AND METHODS

Field experiment was conducted at the Agricultural Research Institute Farm, Rajendranagar, Hyderabad, during *Kharif* and *Rabi* seasons of 1994-95 and *Kharif* season

of 1995 in clay loam soil to assess the impact of temperature and sunshine hours on tiller production in lowland rice varieties. The experiment was laid out in a randomized block design with factorial concept, replicated thrice. The treatments comprised of three dates of planting with three varieties having different growth durations [Sambamahsuri (V<sub>1</sub>) -150 days, Rajavadlu (V<sub>2</sub>) -135 days and Tellahamsa (V<sub>3</sub>) -110 days], during both the years. Dates of plantings thus adopted are D<sub>1</sub> -13.07.94, D<sub>2</sub> -27.07.94, D<sub>3</sub> -13.08.94, D<sub>4</sub> -11.01.95, D<sub>5</sub> -25.01.95, D<sub>6</sub> -04.02.95, D<sub>7</sub> -10.07.95, D<sub>8</sub> -25.07.95 and D<sub>9</sub> -12.08.95. Constant set of package of practices were adopted during both the years of study weather being the only variable. Two units of four hills each selected randomly were pegged and tiller counts were recorded at weekly intervals from second week after transplanting to 50 per cent flowering and were converted to tiller number

per square meter area. The meteorological data recorded at class A observatory nearby were employed to draw inferences. Correlations were worked out between total number of tillers and weather variables.

## RESULTS AND DISCUSSION

### Temperature and tiller production

The data (Table 1) showed that the tiller production was the highest at higher mean temperatures (around 27°C) and decreased with decrease in temperature during active tillering period. A two-week crop period preceding the week of attainment of maximum tiller number stage was considered as active tillering period.

Increase in temperature over a range of 24.1 to 27.4°C increased the number of tillers from 453 to 689 tillers m<sup>-2</sup> in different varieties. These results find support from the findings of Yoshida(1973). Analysis (Table 2) also revealed that the tiller production was positively correlated with the daily mean temperature prevailing during active tillering period in all three varieties. The results further

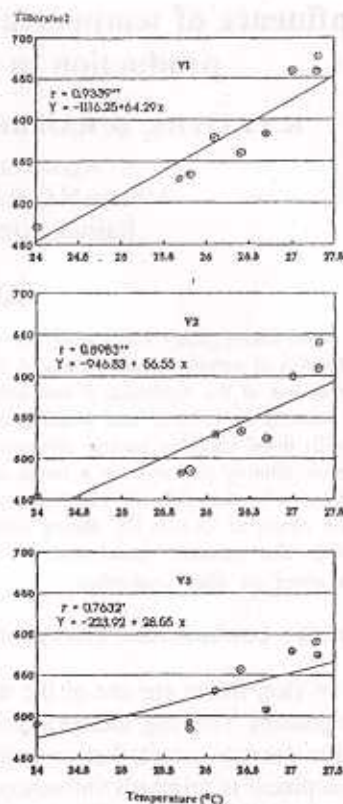


Fig.1: Effect of temperature during active tillering period on tiller production

Table 1: Effect of temperature and sunshine during active tillering period on tiller production

Planting	Daily means of temperature(°C)	Daily means of sunshine hours	Tiller production m <sup>-2</sup>		
			V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>
D <sub>1</sub>	27.1	3.7	658	600	578
D <sub>2</sub>	25.8	4.3	533	484	480
D <sub>3</sub>	25.8	3.6	529	489	484
D <sub>4</sub>	24.1	10.4	471	453	489
D <sub>5</sub>	26.6	10.8	582	524	507
D <sub>6</sub>	27.4	10.4	658	609	573
D <sub>7</sub>	26.5	5.0	560	533	556
D <sub>8</sub>	27.4	6.0	689	649	550
D <sub>9</sub>	26.1	4.4	578	529	529

revealed that tiller production increased slowly over the mean temperature range of 24.1 to 26.6°C and thereafter it was linear when daily mean temperature over active tillering period increased at about 27.4°C in  $V_1$  and  $V_2$  (Fig. 1). Similar results were also reported by Yogeswara Rao (1981). However, the tiller production in cold tolerant thermosensitive variety Tellahamsa ( $V_3$ ) was more or less constant over the temperature range of 24.4 to 26.6°C and increased only when temperature exceeded the range.

### Sunshine and tiller production

Correlation studies (Table 2)

**Table 2 :** Regression (b) and correlation (r) coefficients between total tillers  $m^{-2}$  at maximum tiller number stage and daily means of weather parameters during active tillering period

	Regression coefficients (b)			Correlation coefficients (r)		
	$V_1$	$V_2$	$V_3$	$V_1$	$V_2$	$V_3$
Daily means of temperature (°C)	64.59	56.55	28.55	0.93	0.90	0.76
Daily means of sunshine hours	1.30	-0.74	-0.37	-0.06	-0.04	-0.03

### REFERENCES

- Yogeswara Rao, A. 1981. Studies on the effects of sunshine and temperatures on the yield and yield components of certain popular lowland rice varieties of coastal Andhra Pradesh. Unpublished Ph.D thesis, Andhra University, Waltair.
- Yoshida, S. 1973. Effects of temperature on growth of the rice plant (*Oryza sativa* L.) in a controlled environment. *Soil Science and Plant Nutrition* 19:299 - 310.
- Yoshida, S and Parao, P.T. 1976. Climatic influence on yield and yield components of lowland rice in the tropics. In 'Climate and Rice' International Rice Research Institute, Los Banos, Laguna, Philippines. pp.471 - 494.