

## Effect of Plant Population and Number of Seedlings per Hill on Leaf Area Index of Rice

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The effects of plant spacing and number of seedlings per hill on LAI were studied in two short duration varieties Kanchi (Co. 34) and Kannagi (Pusa 2-21). Planting was done with 25,50 and 100 hills per m<sup>2</sup> with one, two, four and eight seedlings per hill. Planting 100 hills per m<sup>2</sup> with single seedlings per hill recorded the maximum LAI of 7.31 at flowering. Increasing the number of seedlings per hill by adopting wider spacing reduced the LAI due to over crowding of tillers and mutual shading of leaves in the line resulting in early senescence. Equitable distribution of seedlings within the unit area is an important factor in deciding LAI.

There is a positive relationship between leaf area and grain yield and greater the leaf area greater the grain yield (Anon., 1963). Maximum leaf area is recorded at the time of heading. While varieties IR. 8, Jaya, IR. 22 and Padma revealed no optimum LAI, IR. 5, Bhavani (C4-63), TN. 1 and Peta showed an optimum LAI, beyond which grain yields were reduced. The decrease in grain yield was associated with increased lodging at high LAI for the above mentioned varieties (Anon., 1970). Owen (1968) observed that plant type and spacing could alter LAI in chosen varieties. The major limiting factor for higher yield in early maturing varieties is the lower tillering ability and consequent lower leaf area. The effects of plant spacing and number of seedlings per hill on leaf area index of two short duration varieties Kanchi and Kannagi are discussed in this paper.

### MATERIALS AND METHODS

The experiment was conducted in split plot design with the following treatments :-

#### Main plot treatment

- a) varieties : 1) Kanchi (V<sub>1</sub>)  
2) Kannagi (V<sub>2</sub>)
- b) Time of application of Nitrogen (120 Kg per ha) :
  - 1) Two splits - 2/3 basal + 1/3 at panicle initiation (M<sub>1</sub>)
  - 2) Three splits - 1/3 basal + 1/3 tillering + 1/3 at panicle initiation (M<sub>2</sub>)
  - 3) Four splits - 1/4 basal + 1/4 tillering + 1/4 booting (M<sub>3</sub>) + 1/4 heading.

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**Sub plot treatments**

**a) Spacing or number of hills per m<sup>2</sup>**

- 1) 10 X 10 cm (100 hills per m<sup>2</sup>) -(S<sub>1</sub>)
- 2) 20 X 10 cm ( 50 hills per m<sup>2</sup>) -(S<sub>2</sub>)
- 3) 20 X 20 cm ( 25 hills per m<sup>2</sup>) -(S<sub>3</sub>)

**b) Plant density\***

- 1) 100 seedlings per m<sup>2</sup> - (D<sub>1</sub>)
- 2) 200 seedlings per m<sup>2</sup> - (D<sub>2</sub>)

\*The 100 and 200 seedlings per m<sup>2</sup> were planted with above spacings by varying the number of seedlings per hill. The details are given below.

Spacing	No. of seedlings per hill	No. of hills per m <sup>2</sup>
<b>(D<sub>1</sub>) 100 seedlings per m<sup>2</sup></b>		
S <sub>1</sub> : 10 X 10 cm	1	100
S <sub>2</sub> : 20 X 10 cm	2	50
S <sub>3</sub> : 20 X 20 cm	4	25
<b>(D<sub>2</sub>) 200 seedlings per m<sup>2</sup></b>		
S <sub>1</sub> : 10 X 10 cm	2	100
S <sub>2</sub> : 20 X 10 cm	4	50
S <sub>3</sub> : 20 X 20 cm	8	25

It may be seen from the table that six planting patterns, three each under D<sub>1</sub> and D<sub>2</sub> were adopted. The crux of treatments is while the number of seedlings per m<sup>2</sup> remains constant either at 100 or 200, their pattern of distribution within the unit area differed depending on number of hills per m<sup>2</sup> and number of seedlings per hill. The leaf area index was recorded at panicle intitiation, flowering and harvest. As the varieties and different timings of nitrogen did not influence LAI signi-

ficantly, data pertaining to spacing to spacing and density alone is furnished.

**Measurement of Leaf Area Index**

The LAI was estimated by ratio method as detailed by IRRI Philippines (Anon., 1971). The ratio estimate was computed as :

$$Y = \frac{yX}{x} \text{ where}$$

- Y = Total leaf area per hill
- y = Leaf area of sample leaves
- X = Total dry weight of leaves of the whole hill
- x = Dry weight of sample leaves

**RESULTS AND DISCUSSIONS**

The data on leaf area index as influenced by number of hills per m<sup>2</sup> and number of seedlings/hill are given in the Table. In all the three stages viz., panicle initiation, flowering and harvest, S<sub>1</sub> (100 hills per m<sup>2</sup>) with a spacing of 10 X 10 cm recorded the LAI of 4.28, 6.28 and 4.14 respectively and was found superior to S<sub>2</sub> (50 hills per m<sup>2</sup> with a spacing of 20 X 10 cm) and S<sub>3</sub> (25 hills per m<sup>2</sup> with a spacing of 20 X 20 cm). At flowering stage, however difference in LAI between 100 and 50 hills per m<sup>2</sup> was marginal. The leaf area index was maximum (6.28) at flowering and declined to 4.14 at harvest for the treatment S<sub>1</sub>.

The number of seedlings per unit area also influenced leaf area index significantly in all the three stages. The higher seedlings density D<sub>2</sub> (200 seedlings per m<sup>2</sup>) recorded LAI of 3.37 and was significantly superior to D<sub>1</sub>

