

## EFFECT OF DIFFERENT CROP ESTABLISHMENT TECHNIQUES AND TREND IN RICE PRODUCTIVITY

**Dr. S. Anandha Krishnaveni**

Tamil Nadu Rice Research Institute, TNAU, Aduthurai– 612 101, Thanjavur District Tamil Nadu, India

### ABSTRACT

*Rice (Oryza sativa L.) is the most important staple food crop for more than half of the world's population, including regions of high population density and rapid growth. It provides about 21 per cent of the total calorie intake of the world population. In India rice is mostly cultivated through transplanting, in spite of the fact that transplanting is cumbersome practice and requires more labour. The inadequacy of irrigation water and scarce labour coupled with higher wages during the peak period of farm operations, invariably lead to delay in transplanting. To overcome this problem, farmers are gradually switching over to direct seeding under puddle condition. Wet seeding (Sowing pre-germinated seed on to puddle soil) reduces substantially the amount of labour needed for growing of rice crop. The wet seeding also helps to harvest the crop by 8- 10 days earlier than transplanting. It eliminates the use of seedlings and operations such as nursery preparation care of seedlings, pulling, bundling, transporting and transplanting. The demand for more irrigation water and seed rate with transplanting and direct sowing methods signifies the importance of the other methods of rice crop establishment such as system of rice intensification (SRI) to save water. Experiment was conducted during Kharif 2019 in sodic soil comparing different methods of crop establishment techniques. The results revealed that with proper water and weed management under SRI and wet sowing farmers can get similar yields as that of transplanted rice.*

*Keywords: Rice, wet seeding, transplanting, SRI, productivity*

### INTRODUCTION

Rice is the most important human food crop in the world, directly feeding more people than any other crop. Rice is the staple food of more than half of the world's population – more than 3.5 billion people depend on rice for more than 20% of their daily calories. Based on population projections from the United Nations and income projections from the Food and Agricultural Policy Research Institute (FAPRI), global rice demand is expected to rise to 555 million tons in 2035. Worldwide, there are more than 150 million hectares of rice fields. Irrigated lowland fields make up over half of this area and produce 75% of the world's rice. These remain the most important rice production systems for food security – especially in Asian countries. India is an important centre of rice cultivation. The vital role played by rice in the agriculture system and in the diets of people makes it an ideal crop for achieving food and nutritional security, reducing poverty and hunger.

During 1962 the rice area was 357 lakh hectares in India and in 2018 it was around 438 lakh hectares. Though rice is an important food crop, the area under rice cultivation less in India, while compare to the population. The production of rice in 1962 was 332.1 lakh tonnes and in 2018 it was 1127.6 lakh tonnes. The productivity of the rice in India during 1962 was 931 kg/ha and in 2018 it was 2576 kg/ha. Compare the increase in area, the production and productivity of rice in increased.

### Climatic Requirements

In India rice is grown under widely varying conditions of altitude and climate. Rice cultivation in India extends from 8 to 35°N latitude and from sea level to as high as 3000 meters. Rice crop needs a hot and humid climate. It is best suited to regions which have high humidity, prolonged sunshine and an assured supply of water. The average temperature required throughout the life period of the crop ranges from 21 to 37° C. Maximum temp which the crop can tolerate 40°C to 42°C. West Bengal is the largest rice producing state in India. Almost half of its arable land is under rice cultivation. Uttar Pradesh is the second largest rice producing state and Punjab is the third largest rice producing state in India. Tamil Nadu stands in fourth place in rice production.

### Crop Establishment Techniques in Rice

Transplanting	1. Manual 2. Mechanical 3. System of Rice Intensification
Direct seeded rice	1. Drum seeding 2. Broadcasting

### Challenges in Rice Production

Rice is going to suffer the most due to these changes, because of its high water and labour requirements. The development of high-yielding varieties/hybrids of rice and concomitant use of high levels of fertilizer, specially nitrogen, have been the two major drivers of increased rice production in the last four decades. Today, as populations grow, land and water resources for rice production are diminishing. To head off a crisis, governments should promote better crop management techniques and higher-yielding hybrid seeds to reap more from already irrigated lands. Excessive use of pesticides in rice farming pollutes water and creates health hazards. Intensive irrigation can cause salinization and water logging. Small-scale rice farmers will never be rich, but they too can benefit from improved technologies and methods -- if the improvements are designed with small-scale needs in mind. The vast majority of climate change impacts and the overall impact of climate change on rice production are likely to be negative. The rice cultivation faces challenges across the world and India is no exception, with a reduction in area in most of the regions, fluctuation in production and productivity, stagnating yields and ever increasing input costs. The cost of cultivation of paddy has consistently been increasing owing to the increased costs of seeds, fertilisers and labour. With increasing labour scarcity due to urbanisation, sustaining the interest of farmers in rice cultivation has become a challenge. This study analyzes the trend in rice productivity and different crop establishment method for rice under sodic soil condition.

### OBJECTIVES

- i) To find analyze the trend in rice productivity in India and
- ii) To find out the suitable crop establishment method for rice under sodic soil condition

### MATERIALS AND METHODS

The study was conducted at Anbil Dhamalingam Agricultural College & Research Institute, Trichy district of Tamil Nadu. TRY 3 rice variety has been purposely selected for the study and the crop was sown during the kharif season of 2019 under sodic soil condition.

### Different Crop Establishment Methods Used Under Study

No	Crop establishment Techniques	Parameters analyzed
E <sub>1</sub>	Line Transplanting	Plant height (cm) No. of tillers (No's) Leaf Area Index Dry matter production (Kg/ha) Grain yield (Kg/Ha)
E <sub>2</sub>	Machine Transplanting	
E <sub>3</sub>	System of Rice Intensification	
E <sub>4</sub>	Drum seeded Rice	

### DATA

Besides that, to analyze the trend in rice productivity the secondary data was collected from the Reserve Bank of India website. The data was collected from the year 1962 to 2018. For analysis the entire date has divided into Period I, Period II and Period III. The period I consists the year 1962 to 2018. The period II and period III consists of the year 1962 to 1990 and 1991 to 2018 respectively. Period I denotes the green revolution period and the period II denotes the post green revolution period. The green revolution in India was started during 1980's whereas it leads to high growth in the agricultural sector.

The conventional methods of analysis viz., percentages and averages were carried out to estimate the performance of rice production in India.

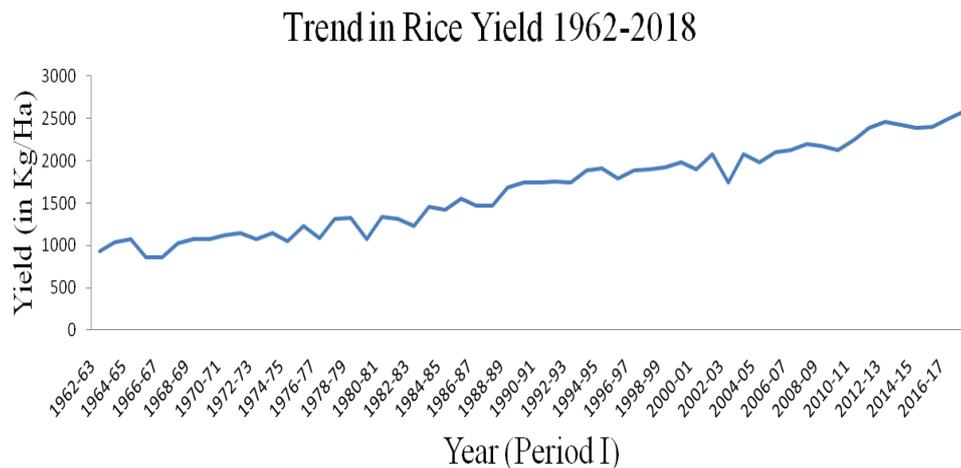
### RESULTS

**Table.1** shows the results of the effect of different crop establishment techniques of rice under sodic soil condition.

Methods	Plant height (cm)	No.of tillers	Leaf Area Index	Dry Matter Production (Kg/ha)	Grain Yield (Kg/ha)	Benefit Cost ratio
Line transplanting (Check)	117	16	3.51	4024	3875	1.7
Machine Transplanting	131	22	3.64	5916	4048	2.1
SRI	138	26	3.82	6325	4563	2.4
Drum seeding	126	18	3.59	4156	3912	1.9

From table.1, all the parameters viz., plant height, No. of tillers, LAI, Dry matter production, grain yield and BC ratio are highest in SRI method of crop establishment followed by machine transplanting.

## 2. Trend in Rice Productivity



**Fig.1** Trend in Rice Productivity

Fig. 1 explains the trend in the productivity of rice over the years from 1962 to 2018 and it is gradually increasing over the years.

## CONCLUSION

The study scrutinized the effect of different crop establishment techniques of rice under sodic soil condition. The results showed that the transplanting is better option under sufficient water and labour availability. Direct seeded rice is an alternate production system with increased use efficiency and profitability with efficient water and weed management. The trend in rice productivity gradually increasing over the years and it is because of introduction of new varieties, hybrids, new methods of production, farm mechanizations etc.

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