

SYSTEM OF RICE INTENSIFICATION ON NUTRIENT UPTAKE AND YIELD OF RICE CROP.

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ABSTRACT

Field experiments were conducted during Navarai Season at Experimental farm, Annamalai University to study the system of Rice intensification (SRI) and their effect on nutrient uptake and Yield of Rice Crop. The treatment has the influence of combined effect of age of the seedlings, spacing, weed management by conoweeder, chemical weeding, manual weeding, nutrient management with organic and inorganic fertilizer and alternate wetting and drying on the growth character, (plant height, tillers hill⁻¹, tiller m⁻², leaf area index, dry matter production) of SRI were studied. Among the treatments, SRI (use of 8-12 days old seedling, 25 × 25 cm of spacing, saturation of water, four times conoweeding only inorganic) significantly increased the growth characters. This was followed by SRI (use of 8-12 days old seedlings, 25 × 25 cm of spacing, four times conoweeding, saturation water, use of 75% inorganic + 25% organic).

Key words: DMP – Nutrient Uptake – Rice Yield.

INTRODUCTION:

SRI is a holistic agro-ecological crop management technique seeking alternatives to the conventional high input oriented agriculture through effective integration of crop soil water continuum. In SRI, one of the sound principles is wider spacing (25 × 25) of plant leading to greater root growth by creating aerobic condition and better tillering potential. Rice fields are kept moist rather than continuous flooding thereby minimizing anaerobic condition and it improves the root growth and aerobic microorganisms. SRI has the edge over others as the method offers not only water saving but also enhances the yield and helps in environmental protection (Norman Uphoff, 2006). SRI increases rice yield two or three fold compared to farmers current rice yields (Norman Uphoff, 2002). Excessive weed growth is one of the major constrains in intermittent irrigation practice followed under SRI. Early and frequent weeding by cono or rotary weeder solves this problem (Stoopet *et al.*, 2002). Burying the weeds in the fields rather than removing them improve the crop yield. Besides, the soil gets aerated and the weeds get decomposed in the soil and turn into organic matter. Due to this, the root and plant grow healthier and higher yields can be achieved. In SRI, methodology productivity will not only increase but input use

efficiency will also be enhanced (Ghosh *et al.*, 2007). The present investigation was conducted to evaluate the principles of SRI and their contribution towards enhancement of growth and yield.

MATERIALS AND METHODS:

Field experiments were conducted at Annamalai University Experimental Farm, Annamalainagar during Navarai with the cultivars of ADT 43 to evaluate the SRI and their contribution towards nutrient uptake and grain yield. The Experimental Farm is situated at 11° 24' North latitude and 79° 44' longitude at an altitude of + 5.79 m above mean sea level. The experiments were taken up in a Randomized Block Design with four replication with seven treatments *viz.*, (T1) - SRI (Use of 8-12 days old seedling raised bed nursery, carefully transplanting at a spacing of 25 × 25, weed management with conoweeder 4 times, saturation of water management use of 75% inorganic +25% of organic, (T2) - T1 with 20 to 25 days old seedlings, (instead of 8-12 days old seedlings), (T3) - T1 with 20 × 15 cm spacing, (instead of 25 × 25 spacing), (T4) - T1 with only inorganic (RDF) (instead of organic + inorganic, (T5) - T1 with herbicide + manual weeding (instead of conoweeding), (T6) - T1 with alternate wetting and drying (instead of saturation of water management), (T7) - conventional transplanting (location specific best management practice).

RESULT AND DISCUSSION:

The data on crop dry matter production (DMP) recorded at harvest in Navarai season is given in Table 1. The highest DMP was recorded under the treatment 8 -12 days old seedling, spacing 25x25 cm with conoweeding four times, saturation of water and using only inorganic (T₄) recorded significantly higher DMP of 11789.27 kg ha⁻¹ at harvest in Navarai season. The conventional method of transplanting recorded lowest DMP of 5261.00 kg ha⁻¹ at harvest stage.

Considering the crop nutrient uptake of N,P,K by the rice crop is given in Table 1. The highest uptake of N,P,K were recorded under the treatment of 8 -12 days old seedling, spacing 25x25 cm with conoweeding four times, saturation of water using only inorganic (T₄) of 125.94 kg ha⁻¹, 25.01 kg ha⁻¹ and 296.13 kg ha⁻¹ respectively. Highest Nutrient uptake was observed in (T₄) and this might be due to better establishment and growth of plants, resulting in higher DMP, competition free environment between plants for better absorption of nutrients, water, sunlight and space. The increased uptake might be due to more functional root system per unit area which absorbed the nutrients released from the nature source. The least N,P,K uptake of 92.03 kg ha⁻¹, 15.01 kg ha⁻¹ and 273.65 kg ha⁻¹ were recorded under the conventional method of transplanting (T₇) respectively and this might be due to reduced supply of nutrients. The report of Hugar *et al.*,(2009), Thekar Singh *et al.*,(2010) and Harish Deshpande *et al.*,(2010) falls in line with our findings.

Table 1: Effect of system of rice intensification on nutrient uptake and yield of rice crop.

Treatment	DMP (kg ha ⁻¹) (Navarai)	Nutrient Uptake(kg ha ⁻¹)			Rice Grain Yield (kg ha ⁻¹) Navarai
		Nitrogen Uptake (kg ha ⁻¹)	Phosphorous Uptake (kg ha ⁻¹)	Potassium Uptake (kg ha ⁻¹)	
T ₁	11532.00	123.74	23.45	294.40	4242
T ₂	8592.00	99.08	17.79	280.04	3632
T ₃	9522.70	101.92	18.49	281.74	3750
T ₄	11789.27	125.94	25.01	296.13	4250
T ₅	10975.20	120.00	19.99	292.53	4236
T ₆	11179.00	122.33	22.43	293.12	4238
T ₇	5261.00	92.03	15.01	273.65	3250
S. Ed	103.63	1.10	0.66	0.59	225
C.D (0.05%)	207.27	2.20	1.46	11.27	382

CONCLUSION:

From the present studies, it can be concluded that under SRI by adapting transplanting with 8-12 days old seedlings, saturation of water, 25 × 25 cm of spacing and only inorganic with four times conoweeding effectively increased the nutrient uptake in Navarai season which paved the way for increasing the rice production.

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