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RESEARCH NOTE

Economical study of summer gujari rice to various establishment techniques and weed control methods

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Abstract : An experiment was conducted during summer season of the year 2009-10 at Regional Research Station, Anand Agricultural University, Anand to assess the response of rice to establishment techniques and weed control methods. Results revealed that transplanting 10-12 days old seedling with spacing of 25 × 25 cm, 1 plant hill^{-1} [System of Rice Intensification (SRI)] + 100:25:00 kg NPK, 25 kg $ZnSO_4$ ha^{-1}, 25 per cent N from FYM and hand weedings were economically efficient as compare to other.

Key Words : Gujari rice, Weed control methods

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Rice is an important cereal crop providing food for more than half of world's human population. In India rice is the second most important crop after wheat and the country is world's second largest producer of rice after China. Total area under rice in India is 44 million hectares with annual production of 92.76 million tonnes (Anonymous, 2006). It is a staple food to feed more than 3 billion people and to provide 50-80 per cent daily calorie intake (Choudhary *et al.*, 2011).

Being the staple food, it plays a significant role in the economy of India and hence, occupies a central position in national agricultural policy and food security (Dangwal *et al.*, 2011). The average per hectare yield of rice in India is less as compared to China due to many factors, such as shortage and high cost of labour, lack of irrigation facilities, quality of germplasm, agricultural output and ecological conditions etc. but the problem of weed invasion is the major contributor in the loss of potential production. Out of total losses incurred to rice due to various biotic stressors, weeds are known to account for one-third (Rao and Nagamani, 2007). Uncontrolled infestation of weeds in rice fields reduces the grain yield by 75.8, 70.6 and 62.6 per cent in dry seeded rice, wet seeded rice and transplanted rice, respectively (Singh *et al.*, 2005).

Rice cultivation consumes 70 per cent water available for agriculture; hence, economizing the water use in rice production has been very important and will be indispensable in coming years. The SRI methodology is of interest because of its potential to achieve higher yield at lower cost of production along with saving of water (Krishna *et al.*, 2008).

Chemical weed control using herbicides, along or in mixtures may result in the control of weed species. Weed suppression can also be achieved through crop canopy management. The objective of present study was

Table 1: Economics of different treatments

Treatments	Total cost of cultivation (Rs. ha^{-1})	Grain yield (kg ha^{-1})	Straw yield (kg ha^{-1})	Gross returns (Rs. ha^{-1})	Net returns (Rs. ha^{-1})	CBR
Main plot treatment: Rice establishment techniques						
S_1: SRI	23776	4563	5753	44523	20747	1:1.87
S_2: Standard I	24420	3694	4350	35858	11438	1:1.46
S_3: Standard II	24220	3960	4780	38515	14294	1:1.59
S_4: Sprouted seed	23213	3677	4322	35686	12473	1:1.53
Sub plot treatment: Weed control methods						
W_1: *Pyrazosulfuron*	23514	4217	5247	41104	17589	1:1.75
W_2: Rotary weeder	24405	4197	5109	40845	16440	1:1.67
W_3: Two hand weeding	24255	4402	5493	42918	18663	1:1.77
W_4: Weedy check	23455	3078	3355	29715	6260	1:1.27

to evaluate successful weed management in rice fields with various crop establishment techniques and weed control methods and weed management practices.

An experiment was conducted with Gujari variety of rice during summer of 2009-10. The experiment was laid out in two factor Split Plot Design comprising of various establishment techniques *viz.*, 1. SRI (transplanting 10 - 12 days old seedlings with spacing of 25 x 25 cm, 1 plant hill^{-1} + 100:25:00 kg NPK, 25 kg $ZnSO_4$ ha^{-1}, 25 % N from FYM) 2. Standard practice I (transplanting 25 - 30 days old seedlings with spacing of 20 x 15 cm, 2 plant hill^{-1} + 100:25: 00 kg NPK, 25 kg $ZnSO_4$ ha^{-1}) 3. Standard practice II (transplanting 15 - 20 days old seedlings with spacing of 25 x 25 cm, 2 plant hill^{-1} + 100:25:00 kg NPK, 25 kg $ZnSO_4$ ha^{-1}, 25 % N from FYM) and 4. Sprouted seed technique under puddled condition (25 x 25 cm by dibbling, 2-3 seeds hill^{-1} + 100:25:00 kg NPK, 25 kg $ZnSO_4$ ha^{-1}) and four weed control methods *viz.,* 1. Pyrazosulfuron @ 150 g ha^{-1} at 25 and 50 days after transplantation (DAT) 2. Use of rotary weeder at 25 and 50 DAT 3. Two hand weedings at 25 and 50 DAT and 4. Weedy check. All treatments were replicated four times. The sowing of nursery for transplanting was started on 15th December onward with 10 days interval as per the treatment.

From this investigation, among the different treatment of rice establishment techniques SRI gave the highest net returns of Rs. 20,747 ha^{-1} with the cost benefit ratio (CBR) 1:1.87 followed by Standard II, Standard I. From the weed control methods, manual hand weeding recorded maximum net returns (Rs. 18663 ha^{-1} and CBR 1:1.75) but post emergence application of *Pyrazosulfuron* was found economical (Rs. 17,589 ha^{-1} and CBR 1:1.77) followed by rotary weeder (Table 1). Jayadeva and Shetty (2008) reported that the CBR was higher with SRI than transplanting and aerobic technique. Dhyani *et al*. (2005) reported that wet seeded rice (sowing of sprouted seeds in puddled condition) with use of herbicide + two hand weedings done at 30 and 60 DAS produced maximum returns followed by transplanting with similar management practices.

Two hand weedings each at 20 and 40 DAS produced almost similar results as that of weed free check and also recorded higher CBR in direct seeded upland rice in sandy loam soils of Faizabad (Tripathi *et al*., 1998).

SRI out yielded direct seeding by recording higher grain and straw yield. SRI provides good aeration, favorable conditions for growth and as a result of which reduce weed competition for nutrient. Similarly, the higher yield was observed due to two hand weedings among the different weed control methods.

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