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Productivity and economics of direct seeded rice in Cauvery delta zone of Nagapattinam district

¹Mathiyazhagan S, ²Jayasudha J, ³Venkatesh M, ⁴Alagesan A, ⁵Ramjegadesh R, ⁶Rajarathinam P and ⁷Subrahmanian K

¹Associate Professor, Department of Plant Pathology, Tamil Nadu Rice Research Station, Aduthurai, Tamil Nadu, India

²Assistant Professor, Department of Agricultural Extension, SRS Institute of Agriculture and Technology, Vedasandur, Tamil Nadu, India

³Assistant Professor, Department of Agricultural Economics, SRS Institute of Agriculture and Technology, Vedasandur, Tamil Nadu, India

⁴Associate Professor, KVK, Vamban, Pudukkottai, Tamil Nadu, India

⁵Assistant Professor, National Pulse Research Station, Vamban, Tamil Nadu, India

⁶Associate Professor, Department of Agronomy, Tamil Nadu Rice Research Station, Aduthurai, Tamil Nadu, India

⁷Director, Tamil Nadu Rice Research Station, Aduthurai, Tamil Nadu, India

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Corresponding Author: Mathiyazhagan S

Abstract

Rice is major staple crop. The study was conducted in Vedharanyam, Kilvelur and Nagapattinam of Nagapattinam district. The total of 55 farmers were selected as beneficiaries for the study. The documentation of agronomic practices followed for the production of direct seeded rice has been done. The study shows that average no. of Plants/m² was 34, no. of productive tillers/plant was 27, length of Panicle/plant (cm) was 27, no. of grain/ panicle was 132, 1000 grain weight was 16 and Yield - Grain yield (kg/ha) was 5605. average expenditure was 34,890, gross return (Rs/ha) was 1,24,918, net return (Rs/ha) was 90,666 and B:C ratio was 3.5. This study concluded that higher net income was in direct seeded rice which would be beneficial for the farmers.

Keywords: Rice, direct seeded, economics, Nagapattinam

Introduction

Rice (*Oryza sativa* L.) is the prime source of food for nearly half of the world's population. The problems faced by farmers were water scarcity, the farmers were facing the problem of acute labour shortage and hike in wage rate. Transplanting takes 240 to 250 man hr/ha, which is 25 percent of the total labour requirement of the rice crop (Ojha and Kwatra, 2014) [4]. The conventional method of rice growing is not only water-guzzling but also cumbersome and laborious. Rice transplanting requires 200-250 man-h ha-1, which is 25% of the total requirement for the rice crop production. The problem has further been intensified with the timely unavailability of labour (Kumar *et al.*, 2015) [1]. Direct-seeding was cost-effective, which saves water through earlier rice crop establishment (Ladha *et al.*, 2003; Singh *et al.*, 2003) [2, 7]. With alternate wetting and drying cycles in DSR, the crop was subjected to greater weed competition than transplanted rice because weeds emerge before or at the same time as the rice. Therefore, heavy weed infestation is a major problem in direct seeded rice and its success lies in effective weed control measures (Singh *et al.*, 2003; Rao *et al.*, 2007) [2, 5]. This study was

taken under Tamil Nadu Irrigated Agriculture Modernization Project (TN – IAMP). The World Bank Supported TN IAM (Irrigated Agriculture Modernisation) Project is a follow up of IAMWARM (Irrigated Agriculture Modernisation and Water-Bodies Restoration and Management) Project which has made significant development impacts in the state by modernising irrigation infrastructure, improving water use efficiency, enhancing yields and productivity of agriculture in a climate resilient production systems, diversification towards high value crops, strengthening the institutional reforms through Participatory Irrigation Management (PIM) and Water Users Association (WUA). The IAM Project will bring the policy and institutional development achieved under IAMWARM project to a new level and will serve as the key vehicle for implementing the Tamil Nadu Government agenda in further enhancing water and agriculture productivity in a sub basin framework.

The objectives of the study were

1. To study the productivity of the direct seeded rice
2. To study the economics of the direct seeded rice.

Research methodology

The study was conducted in Nagapattinam district by purposive sampling technique. The blocks selected were Vedharanyam, Kilvelur and Nagapattinam. The total of 55 farmers were selected as beneficiaries for the study. The documentation of agronomic practices followed for the production of direct seeded rice has been done. An interview schedule was developed for collection of the data. The data was collected through personal survey method and tabulated analyzed and interpreted in terms of the objectives. The statistical tools used for the study were gross return, net return and BC ratio.

Gross return = Per acre gross returns were calculated based on the sample farmers' total income realized by output times the actual market prices in rupees. Gross income is the value of the main product plus by-products.

Net return = The net return was computed by subtracting to the total (cost c) from the gross return (eands.da.gov.in).

B:C ratio = Gross return/ Net return. (Shende and Meshram, 2015; Nirmala and Muthuraman, 2016).

Results and Discussion

The results are tabulated under the following tables.

Agronomic practices followed for the crop:

1. **Soil type:** Sandy clay
2. **Source of irrigation:** Canal
3. **Variety:** ADT 45
4. **Fertilizer applied:** ZnSo₄: 25 Kg/ha
5. **Biofertilizer (Kg/ha):**
 - *Azospirillum*: 1 lit
 - *Phosphobacteria*: 1 lit
 - *Bacillus Subtilis*: 1 lit
 - **Vermicompost:** 150
6. **Weed management**
 - a. Herbicide applied (30-35 DAT): Bispyribac – sodium (Nominee Gold) + one hand weeding
 - b. No. of. hand weeding (15 & 30 DAT)
7. **Irrigation details**
 - a. Quantity of irrigation water (No. of. Irrigation x Qty. Used/ Irrigation): 9 irrigation = 700 mm
 - b. Effective rainfall received (50% total rainfall): 67.5 mm
 - c. Total water consumed (a+b) = 887.4 mm

Table 1: Demonstration area under direct seeded rice

Sl. No.	Name of the farmer	Village	Demo extent (ha)
1	Somu	Sangamangalam	1
2	Anbalagan	Sangamangalam	1
3	Rani	Sangamangalam	1
4	Bathmavathi	Sangamangalam	1
5	Selvamani	Sangamangalam	1
6	Mohananadarjan	Sangamangalam	0.53
7	Rajam	Sangamangalam	1
8	Kannan	Sangamangalam	1
9	Gunaseelan	Sangamangalam	1
10	Sekar	Sangamangalam	1
11	Anbumani	Sangamangalam	0.75
12	Elangovan	Sangamangalam	1
13	Dhanabal	Sangamangalam	1
14	Sudhakaran	Sangamangalam	0.80
15	Usha	Sangamangalam	1
16	Anbalagan	Sangamangalam	1.04
17	Saroja	Sangamangalam	1
18	Keasavaraj	Sangamangalam	0.73
19	Kumaresan	Sangamangalam	1
20	Anjan	Sangamangalam	0.60
21	Sasikumar	Sangamangalam	0.75
22	Nadanasigamani	Sangamangalam	1
23.	Jagathisan	Sangamangalam	1
24.	Vijayakumar	Sangamangalam	1
25.	Manoharan	Sangamangalam	1
26.	Arujunan	Sangamangalam	1
27.	Sankar	Sangamangalam	1
28.	Soundhar	Sangamangalam	1
29.	Rajenthiran	Sangamangalam	1.03
30.	Janagam	Sangamangalam	1
31.	Kumaravel	Sangamangalam	1
32.	Ganagaraj	Sangamangalam	0.39
33.	Muthalagi	Sangamangalam	0.58
34.	Balasubramaniyan	Sangamangalam	0.62
35.	Boominathan	Sangamangalam	1.14
36.	Thangamani	Sangamangalam	0.40
37.	Balasubramaniyan	Sangamangalam	1
38.	Kumar	Sangamangalam	1

39.	Jayabalan	Sangamangalam	1
40.	Sasikumar	Venmancherry	0.51
41.	Govintharajalu	Thiruvaimur	1
42.	Maragatham	Venmancherry	0.98
43.	Karikalan	Alangudi	0.80
44.	Jayabal	Kurichy	1
45.	Susi	Kurichy	1
46.	Ezhilarasan	Kurichy	1
47.	Maikilsamy	Kurichy	1
48.	Prancil	Kurichy	0.42
49.	Thangam	Kurichy	0.88
50.	Chinnappa	Kurichy	0.80
51.	Chithadurai	Kurichy	0.87
52.	Mani	Kurichy	1
53.	Rajasekaran	Kurichy	0.39
54.	Pannirselvam	Kurichy	1
55.	Rajagobal	Kurichy	0.68

Table 2: Yield (Productivity) characteristics of the crop

Farmer	No. of Plants/m ²	No. of productive tillers/plant	Length of Panicle/plant (cm)	No. of grain/panicle	1000 grain weight(g)	Yield: Grain yield (kg/ha)
1.	35	25	21	105	15	6500
2.	36	28	20	115	15	6300
3.	45	32	15	100	15	6100
4.	33	29	30	95	19	6500
5.	36	28	20	115	15	5900
6.	35	23	25	125	17	3445
7.	31	22	25	105	20	5900
8.	31	23	250	95	13	6400
9.	32	23	11	1205	14	6000
10.	33	24	19	95	15	6300
11.	33	24	25	105	13	4875
12.	31	26	25	131	14	6400
13.	36	28	20	115	15	6200
14.	32	25	29	111	19	5200
15.	30	21	25	121	11	5900
16.	24	20	25	95	12	6760
17.	35	27	25	132	14	6100
18.	31	25	22	111	12	4754
19.	36	28	20	115	15	6300
20.	31	30	27	85	10	3900
21.	40	30	26	100	16	4875
22.	39	22	27	105	18	6600
23.	32	30	15	110	18	6300
24.	31	26	25	121	20	6100
25.	30	26	28	123	19	5900
26.	30	26	20	110	15	6500
27.	45	25	22	165	20	6300
28.	41	30	29	99	15	6600
29.	36	38	22	121	15	6695
30.	31	25	21	105	20	6100
31.	39	32	21	121	16	6400
32.	39	23	25	123	19	2535
33.	39	21	24	131	18	3770
34.	31	26	25	121	15	4030
35.	34	26	21	109	18	7410
36.	31	38	25	121	19	2600
37.	33	26	26	134	14	6500
38.	35	24	20	132	15	5900
39.	31	33	25	103	21	6400
40.	31	26	25	100	18	3315
41.	38	28	20	115	15	6500
42.	31	25	29	121	15	6370
43.	39	35	25	109	16	5200
44.	31	26	25	121	19	6400

45.	38	30	21	101	18	6100
46.	31	23	21	105	15	5900
47.	34	29	25	101	17	6500
48.	31	38	25	100	20	2730
49.	32	28	25	108	19	5720
50.	31	23	25	101	15	5200
51.	31	20	25	115	18	5655
52.	31	29	25	119	18	6400
53.	35	22	24	101	15	2535
54.	34	28	29	124	20	6100
55.	33	21	24	100	13	4420
Average	34	27	27	132	16	5605

From the table 2, it was observed that average no. of Plants/m² was 34, no. of productive tillers/plant was 27, length of Panicle/plant (cm) was 27, no. of grain/ panicle was 132, 1000 grain weight was 16 and Yield - Grain yield (kg/ha) was 5605.

Table 3: Economics of Direct Seeded Rice

Farmer	Expenditure (Rs/ha)	Gross return (Rs/ha)	Net Return (Rs/ha)	B:C Ratio
1.	39750	144950	105200	3.6
2.	37750	140490	102740	3.7
3.	39450	136030	96580	3.4
4.	39250	144950	105700	3.6
5.	39450	131570	92120	3.3
6.	21100	76823	55723	3.6
7.	38250	131570	93320	3.4
8.	37550	142720	105170	3.8
9.	39950	133800	93850	3.3
10.	39150	140490	101340	3.5
11.	29900	108712	78812	3.6
12.	36750	142720	105970	3.8
13.	39150	138260	99110	3.5
14.	31800	115960	84160	3.6
15.	39550	131570	92020	3.3
16.	41340	150748	109408	3.6
17.	38750	136030	97280	3.5
18.	29100	106014	76914	3.6
19.	39250	140490	101240	3.5
20.	23900	86970	63070	3.6
21.	29900	108715	78815	3.6
22.	39150	147180	108030	3.7
23.	39950	140490	100540	3.5
24.	39450	136030	96580	3.4
25.	39650	131570	91920	3.3
26.	39150	144950	105800	3.7
27.	38750	140490	101740	3.6
28.	38950	147180	108230	3.7
29.	41000	149298	108298	3.6
30.	39950	136030	96080	3.4
31.	39000	142720	138820	3.6
32.	15500	56530	41030	3.6
33.	23100	84071	60971	3.6
34.	24700	89869	65169	3.6
35.	45500	165243	119743	3.6
36.	15900	57980	42080	3.6
37.	39750	144950	105200	3.6
38.	39150	131570	92420	3.3
39.	39700	142720	103020	3.5
40.	20300	73950	53650	3.6
41.	39500	144950	105450	3.6
42.	39900	142051	102151	3.5
43.	31800	115960	84160	3.6
44.	39150	142720	103570	3.6
45.	39650	131570	91920	3.3
46.	39600	131570	91970	3.3

47.	39750	144950	105200	3.6
48.	16695	60879	44184	3.6
49.	34980	127556	92576	3.6
50.	31800	115960	84160	3.6
51.	34600	126106	91506	3.6
52.	39700	142720	103020	3.5
53.	15500	56530	41030	3.6
54.	39600	136030	96430	3.4
55.	27100	98566	71466	3.6
Average	34890	124918	90666	3.5

From the table 3, it was observed that average expenditure was 34,890, gross return (Rs/ha) was 1,24,918, net return (Rs/ha) was 90,666 and B:C ratio was 3.5.

Conclusion

From the study, it has concluded that in direct seeded rice, lower water requirement and higher net income. In traditional method, B:C ratio will be 1.5, in case of direct seeded rice the B:C ratio was 3.5, which would be beneficial for the farmers. Direct seeding is a good alternative to transplanting as it is more economical and labour saving.

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