Economy analysis of cost required for organic rice cultivation in two cultivation techniques

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Abstract

The initial investment of rice cultivation by mechanical technique was high. This was only due to the cost of planting machine. We analysed the overall cost (without machine cost) and benefits of the two methods, it manifested that the mechanical method is very much beneficial over traditional rice cultivation technique. We observed that the requirement of soil, irrigation water, number of seeds etc. decreased in mechanical cultivation technique while net income increase by 13.07% with 80% government subsidy. Furthermore, the initial rooting was quicker, growth and development of pot raised seedlings was better than the traditional technique. Hence, this technique can give better return to the farmers with the help of government subsidy.

Introduction

Due to climate change agriculture production decreases including rice so net return for the farmers also decrease. So there is an urgent demand of technique which can give good return to the farmers. Mechanical agriculture may be useful in order to get better return from rice cultivation. In 2010, total 165 pot transplanting machines are supplied in Korea. Keeping this in mind we analyzed the two cultivation techniques for the rice production in the farmer's fields on various locations.

Materials and methods

Four cities, Kunsan, Iksan, samgi and Namwon of Jeollabuk-do, were selected for this study. Investigation was done in twelve organic rice producing farmhouses, from April to October, 2009. Rice was cultivated with mechanical and traditional methods and observations viz. yield, production cost and income, were recorded and expressed in per 10a.

Results and Discussion

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Use of mechanical transplantation technique reduced the labor of farmers but it increased the production cost by ~2.5 times, as compared to traditional method. The money required for rice seedling production by traditional method was; cost of equipment needed for planting, 20M₩/10a, seedling plate 1.1M₩, so total cost was equal to 21.1M₩. In mechanical method, 37.8M₩ for pot planting equipment, 5.8M₩ for seed sowing equipment and 8.3M₩ for Pot plate. Total cost investment was 52M₩ /10 acres. Mechanical method reduced the requirement of seeds by 78%; only two-three seeds are required for sowing in each pot of plates. In this method 40-50g seeds/plate are required as compared to 180-220g/plate in traditional method. Soil requirement also decreased to 50%. Furthermore, only 40-50 plants/m^2 used by planting machine as compare to 70-80 plants/m^2 of traditional method. Hence, it decreases the requirement of seed per m^2 by 42%. Cost of materials required for seeds, soil organic fertilizer and eco-friendly materials etc. was 148,888₩/10a in traditional method while in pot planting method required only 129,595₩/10a. Thus, net saving of 19,293₩/10a per year. In traditional method, a farmer use 8.7 hours in preparation of seedlings and 9.85 hours in seedling transplanting. Net Income was 919,002₩/10a, by traditional method while 24,864₩/10a by mechanical method. But with the 80% subsidy provided by government return increased to 1,057,184₩, which was 13.07% higher than the traditional method.

Table 1. Comparative investment of two methods for transplanting equipments (Unit: 1,000₩)

Details	Custom (A)	Pot Seedling type(B)			B/A
		Iksan	Namwon	Mean	
Transplanting	20,000	38,700	37,000	37,850	-
machine	-	5,850	5,700	5,775	-
Seedling machine	1,130	10,177	6,409	8,293	
Pot	(25,000)	(2,077)	(1,308)	(1,693)	
Total	21,130	54,727	49,109	51,918	2.46
Subsidy by GOK	0%	80%	60%	70%	

Table 2. Depreciation cost of two techniques per year.

Cost	Traditional (A)	Pot seedling type (B)			B/A		
		Iksan	Namwon	Mean	Iksan	Namwon	Mean
Depreciation cost/year (A)	2,373	6,941	5,410	6,175.5	2.93	2.28	2.60

Working area/year	Working Days Total Working area(B) Actual area (C)	15 days 30 21	15 days 20 5.9	15 days 20 3.7	15 days 20 4.8	- - -	- - -	- - -
Depreciation cost/10a	Total working area (A/B) Actual area (A/C)	79.1 113.0	347.0 1,176	270.5 1,462	308.8 1,319	4.38 10.41	3.42 12.94	39.0 10.67
Subsidy(%) Depreciation cost/10a	Total working efficiency Actual area	79.1 113.0	69.4 235.2	108.2 584.8	88.8 410.0	0.88 2.08	1.37 5.18	1.12 3.63

※Total working days × total working area/day 2) Depreciation cost/10a - Subsidy(%)

Table 3. Comparative investment chart for materials required for rice cultivation/10a (Unit: ₩)

Material	Traditional method (A)			Pot seedlings type (B)			B/A		
	Iksan	Namwon	Mean	Iksan	Namwon	Mean	Iksan	Namwon	Mean
Seed	10,125	8,250	9,188	1,517	2,833	2,175	0.15	0.34	0.24
Soil	20,950	20,950	20,950	3,333	3,333	3,333	0.16	0.16	0.16
Organic fertilizer	70,000	50,000	60,000	72,000	57,350	64,675	1.03	1.14	1.08
Eco-friendly materials	45,500	72,000	58,750	46,824	72,000	59,412	1.03	1.00	1.01
Total	146,575	151,200	148,888	123,674	135,516	129,595	0.84	0.90	0.87

※ Seed : Traditional method 6.8 kg/10a, pot seedling type 1.0 kg/10a

Table 4. Comparative analysis of net income from the two rice culture techniques per10a

Details	Conventional farming 1)	Mechanical farming 2) Depreciation cost (kg)

		Traditional (A)	Pot seedling (B)	B/A	80%g subsidy (C)	60% subsidy (D)
Total income	Yield	650	720	1.11	720	720
	price	1,800	2,050	1.14	2,050	2,050
	Income	1,170,000	1,476,000	1.26	1,476,000	1476,000
Working expense	Machine cost	79,000	1,319,000	16.70	263,800	527,600
	Others cost	148,888	129,595	0.87	129,595	129,595
	Labor cost	23,110	25,421	1.10	25,421	25,421
	Total	250,998	1,451,136	5.78	418,816	682,616
Net income		919,002(100)	24,864(2.7)	0.03	1,057,184(105.0)	793,384(86.3)

Conclusions

There is no doubt that this technique can gives better returns to the farmers but as its initial investment is high so government have to give initial support in terms of subsidy to the farmer to encourage adoption of this technique. More research and development is needed to make this technique more efficient and economic for the farmers.

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