The Rice Growth and Yield for Organic Rice Production on Pot Seedling type

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Abstract

In traditional organic rice culture practices, control of weeds is a big problem. This study was conducted to increase the rice production. Results showed that Plant height, SPAD, root length and weight were higher in pot raised seedling than broadcasting method except number of panicles. High plant density caused reduction in plant height, number of culm and chlorophyll content of the rice. No lodging was observed in both methods. Thickness of third internode and culm length was more in pot raised seedlings at both sites. When organic material was used rice yield increased by 3.81%. Higher rice production (10%) was recorded in the fields planted with pot raised seedlings. From the above study it could be conclude that the pot raised seedlings perform better than the seedlings raised by broadcasting methods.

Introduction

In traditional organic rice culture practices, control of weeds is a big problem. Use of ducks and snails are very common in Japan and this method is widely used over the years (2005). This method is useful but also has some drawbacks. When water level in field is low and seedlings are small, besides the weeds, ducks/snails feed on rice seedlings too. Growth rate of weeds are faster than the rice seedlings so they compete successfully with rice seedlings for nutrients, water and space. This causes reduction in rice production. Keeping all these problems in mind we have developed a new method for rice cultivation. In this study, we have tested this proposed methodology in the farmer's field.

Materials and methods

Experiments were conducted in a farmer's fields of Iksan, Jeollabuk-do, Korea, during 2009-10. Seedlings were prepared in plates containing 448 pots. Two to three seeds of 'Samkguang' cultivar were sown in each pot and 40-50 days old seedlings were used for transplanting. Morphological parameters, SPAD and yield attributes were recorded.

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Results and Discussion

Plant height, SPAD, root length and weight were higher in pot raised seedling than broadcasting method except number of panicles (Fig. 1 and Table 1). High plant density caused reduction in plant height, number of culm and chlorophyll content of the rice (table 2). No lodging was observed in both methods. Thickness of third internode and culm length was more in pot raised seedlings at both sites. When organic material was used rice yield increased by 3.81% (Table 4). Higher rice production (10%) was recorded in the fields planted with pot raised seedlings (Table 5 and 6).

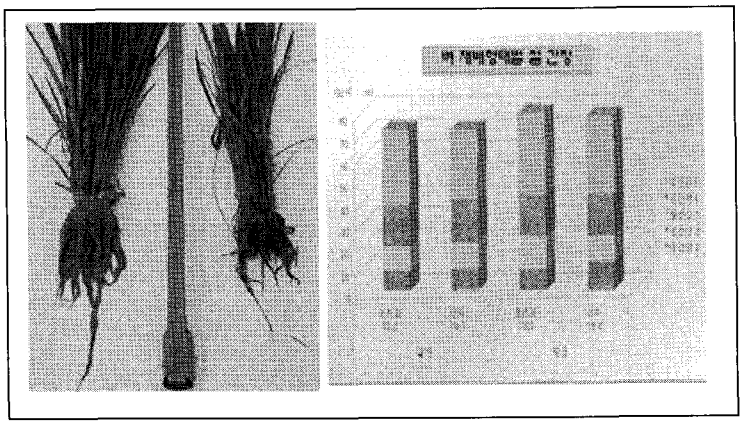

Fig. 1. Root growth of rice in pot raised seedlings and in traditional method.

Table 1. Growth characteristics of rice in organic farmer's field.

Methods	Plant Length (cm)	Panicle (no/hill)	SPAD	Root Length (cm)	Root weight (g/hill)
Broadcasting method	54.0	17.1	35.2	20.3	7.1
Pot seedling	73.2	12.8	37.8	23.1	8.9

Table 2. Effect of population density on the growth parameters of rice raised by pot seedlings

Parameters	Number of rice seedling hills(hill/3.3 m²)			
	41	45	50	56
Plant length (cm)	55.1	53.0	52.1	50.7
Culm(no/hill)	17.9	16.9	16.2	15.1
SPAD	39.6	38.5	37.3	35.9

Table 3. Thickness of third internode according to the rice cultivation pattern and at two different sites.

Parameters	Samgi site		Mangsung site		Lodging (0 ~ 9)
	Pot seedling	Broadcasting method	Pot seedling	Broadcasting method	
length of 3rd internode (mm)	3.74	3.40	3.75	3.47	No lodging
Column length	72.6	72.3	79.9	78.4	No lodging

Table 4. Rice yield and organic materials type

Details	Panicle (no/hill)	No. of grain (no/panicle)	Ripened grains (%)	Grains weight (g)	Yield (kg/10a)
Non-application	19	91	66.2	22.0	530
Application	19	93	71.9	23.0	551

Table 5. Yield and yield attributes of rice cultivated from seedlings developed by two different methods.

Details	Panicle (no/hill)	No. of grain (no/panicle)	Ripened grains (%)	Grains weight (g)	Yield (kg/10a)
Broadcasting method	18	88	68.4	22.0	529
Pot seedlings	20	105	70.8	24.0	582

Table 6. Yield and the components according to cultivation pattern

Transplanting (hill/㎡)		Panicle (no/hill)	No. of grain (no/panicle)	Ripened grains (%)	Grains weight (g)	Yield (kg/10a)
Pot	50	19	101	72.4	24.0	542^{ab}
	56	21	95	68.2	24.0	555^{a}
Spray	60	17	87	73.4	22.0	535^{ab}
	70	16	85	64.9	22.0	506^{b}

Conclusions

From the above study it could be conclude that the pot raised seedlings perform better than the seedlings raised by broadcasting methods. Pot raised seedlings grow faster than traditional method and their root establishment was better. Hence, this method of rice cultivation is better previous method and can give higher returns to the farmers.

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