International Journal of Students' Research in Technology & Management
eISSN: 2321-2543, Vol 7, No 1, 2019, pp 13-16
https://doi.org/10.18510/ijsrtm.2019.713

COMPARATIVE STUDY OF RICE (*Oryzasativa*L.) CULTIVATION IN POLYBAG TO CULTIVATION IN LOWLAND

[1*]Rina Royani, [2]Erna Risfaula Kusumawati, [3]Fenny Widiyanti, [4]Hesti Ariestina
[1]Bachelor Student, [2,3]Lecturer in Science Education, [4]Lecturer in Education of Islamic Elementary School Department
Faculty of Education and Teachers Training, IAIN Salatiga, Salatiga, Indonesia
Email: *rinasuci2@gmail.com, ernarisfaula@iainsalatiga.ac.id, fennywidiyanti@iainsalatiga.ac.id, hestiariestina22@gmail.com

Article History: Received on 10th January, Revised on 10th February, Published on 24th February 2019

Abstract

Purpose of the study: Rice (Oryza sativa L.) is the leading food consumed by Indonesian people even in Asia. The various innovations in rice cultivation still being developed to increase the yield both in quantity and quality. In general, rice cultivation is planted in the lowland. This research aims to compare the productivity of rice cultivation in a polybag to rice cultivation in the lowland.

Methodology: The size of the polybag that used in the experiment is 40x40 cm with space 50 cm of each other. The experiment was conducted in Nganjuk, East Java, Indonesia. The variables studied are rice yield and rice varieties. The varieties used are Ciherang and Sertani 12.

Main Findings: The result showed that rice production yield includes the number of filled grains, total grain, and panicle number in polybag more than in lowland. Rice cultivation produces 2 kg/m^2 in a polybag and 1 kg/m^2 in the lowland. The panicle number of rice in polybag is more than in lowland, i.e., 12 in a polybag and 6 in the lowland. For the rice variety, Ciherang and Sertani 12 have the same yield in a polybag. It is 2 kg/m^2.

Applications of this study: The rice cultivation in polybags has an easy cultivation system and suitable for urban areas where agricultural land is limited. Besides, it can be the solution for decreasing agricultural land from time to time.

Novelty/Originality of this study: The novelty of this research is the use of polybags as the media of rice cultivation, which is not commonly done in farming.

Keywords: polybag, rice, lowland, productivity, east java

INTRODUCTION

Rice (*Oryza sativa* L.) is the main food consumed by Indonesian people. It also the principal food for more than 50% of the world's population (Jahan, Sarkar, & Paul, 2017). Therefore the Indonesia government gives particular concern to rice cultivation to achieve food sufficiency. The fulfillment of rice always rises, dealing with increasing the number of population (growth response) (Sari, Ete, & Made, 2017). The fulfillment of the needs of rice faces many obstacles. They are the phenomenon of global climate change which influences to the amount of yield produced by the crop and the distribution of foodstuff, the constriction of farmland which effected by the user of this area for non-farming activity, and the high level of degradation of farmland that causes the lack of yield. Therefore, the new strategy in the fulfillment of foodstuff is function the constrict land optimally. If it can be functioned optimally, obstacles to the fulfillment of the foodstuff will be removed.

The intensification of farming can be applied by using several methods. One of them is using a polybag for the cultivating system. It is done to preserve and to optimize the constrict land. The cultivating using polybags gives many benefits. Some horticultural plants, such as fruits and vegetables, have been developed by using a polybag system. The researches had been done by (Adu-Yeboah et al., 2015) (Abugre S. & C. Oti-Boateng, 2011) (Onggo, Kusumiyati, & Nurfitriana, 2017), etc. A limited number of researches have been done on cultivating staple plants like rice, soy, corn, etc.

Therefore, we develop the cultivation of staple plants, especially rice, by polybag system. We expect the result of our research can be one of the alternative solutions for developing the farming in constrict and limited land, which is suitable for urban areas.

LITERATURE REVIEW

The Experimental investigation of rice cultivation was performed by (Ginting, Damanik, Sitanggang, & Muluk, 2015). The purpose of the experiment was to know the impact of shade, organic materials, and varieties on upland rice's growth and production. The result showed that the number of tillers, panicles, and grains could be decreased by shade on upland rice varieties. The organic matter can increase the number of panicles, grains production of upland rice.

The other research about rice cultivation also was investigated by (Sarker, Uddin, Sarkar, Salam, & Hasan, 2017). The experiments were conducted in Bangladesh to investigate water management and cultivars effect on yield, growth, and biomass production. The result showed that good water management helped to increase rice production. There were five water management systems used in their research.

The varieties of rice also affect the amount of harvest. The investigation of productivity on several varieties of rice had been conducted by (Hambali & Lubis, 2015). The rice varieties used are Inpari 13, Ciherang, Mentik Wangi, Mekongga, IPB 4S, and Hipa Jatim 2. The results showed that Inpari 13, Ciherang, and Mekongga have higher yields than other varieties.

Experimental studies were performed by (Hatta 2011) on the impact of plant spacing types on growth, yield components, and yield of rice. The results showed that rice yield significantly affected by types of plant spacing. But, the types of plant spacing do not influence panicle length, number of grains, and flowering period. The other research, almost the same as (Hatta, 2011) was conducted by (Widayat & Purba, 2015). The purpose of this research was to determine the impact of the combination of plant spacing and weeding frequency on rice productivity. The rice variety used is Ciherang.

The impact of cropping, size of vessel, and fertilizers on the growth and yield of rice was investigated by (Humaerah, 2013). The fertilizers used are compound fertilizers. The results of this experiment showed that the conventional cropping systems give higher growth and yield of rice than the hydroponic system. The diameter of the vessel also affects the number of panicles.

The research about the effect of the cropping system on growth and yield of rice production had been investigated by (Lita, Soekartomo, & Guritno, 2013). It has been implemented in Lowland of Sumbersekar, Dau Subdistrict, Malang. The results showed that the planting method of SRI (system of rice intensification) and direct seeding planting with organic planting ribbon afford components growth and higher yield than conventional planting methods.

METHODOLOGY

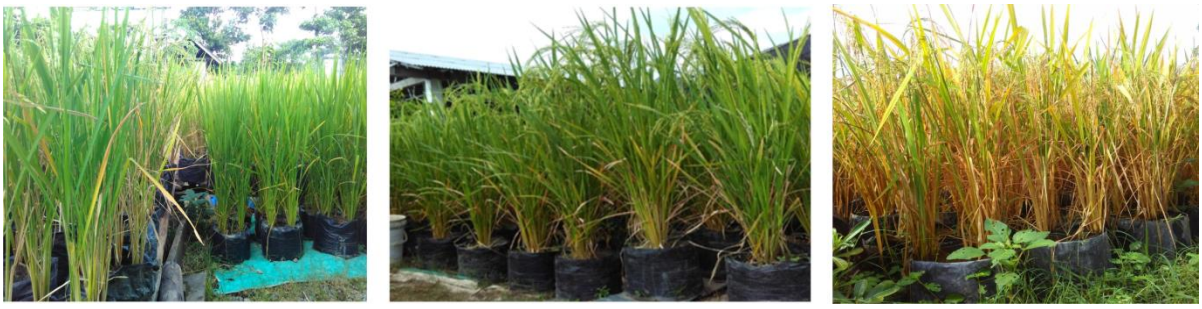
The research was conducted in Nganjuk, East Java, Indonesia, from January to March 2018. The experiment includes a) polybag preparation; b) tools preparation; c) growth; d) maintenance; and yield. Polybag using bags of 40x40 cm with the space 50 cm of each other. Plant media consist of soil, compost, husk charcoal, organic fertilizer, "manutta gold." The composition of soil to other materials is 4: 1. Fertilizer concentrations for one polybag experiments were applied 250 litres of water mix with 15ml of liquid fertilizer. Plant media could be used three until seven days after the grass grows on it. The growing grass in the polybag indicates the existence of microorganisms. So, the planting media is ready to be used for cultivating.

The rice varieties used are Ciherang and Sertani 12. These were popular varieties planted by farmers. Because of more taste, shinier, and white color. The maintenance includes irrigation, fertilizer, and pest control. The rice cultivation in polybag more controlled than in lowland. The yield was conducted after the color of grain was yellow, solid, not runny, and rather hard. It merely three months. The harvesting can be done after the plant has reached the ideal characteristic of harvest. They are: All of the grain are turn into yellow color, compact, and juiceless.

FINDINGS / RESULTS

Figure 1 shown the rice planted in polybags. There were three steps of growth, i.e.:

a) Rice began to produce
b) Rice was still in the process of ripening grain
c) Rice was ready to be harvested



(a) **(b)** **(c)**

Figure 1: Rice cultivation in polybag

DISCUSSION / ANALYSIS

The experiment result was described in Table 1. Table 1 shows that the yield of rice production includes the amount of filled grains, total grain, panicle number in polybag more than in lowland. Rice cultivation produces 2 kg/m^2 in polybags and 1 kg/m^2 in the lowland. The panicle number of rices in polybag is more than in lowland, i.e., 12 in polybag and 6 in lowland.

Table 1: Yield comparison in polybags and lowland

Media Plant	Varieties					
	Ciherang			Sertani 12		
	Amount of filled grains(kg)	Total grain (tons Ha)	Panicle number	Amount of filled grains	Total grain	Panicle number
Polybags	2	20	12	2	20	12
Lowland	1	10	6	1	10	6

Source: Observation Analysis

The yield in polybag is two times more than the yield of rice in the lowland. The controlling includes the growth process, water intensity, and pest management. The other particular advantage of planting media is beside it gives more yield; the rice cultivating in polybag has an easy system. Therefore, the rice cultivating need not vast land as a rice field in common, but it can be done in the constrict area around the house. This study's impact is that many people can plant rice for good yield even though they don't have a rice field. The method of planting/cultivating in polybag is suitable for urban areas where agricultural land is limited. Besides, it can be the solution for decreasing agricultural land from time to time.

For the rice variety, Ciherang and Sertani 12 have the same yield in a polybag. It is 2 kg/m^2. It is because these two varieties of rice have almost the same characteristic. Ciherang able to produce compact rice, and sertani 12 has strong and long malai. These varieties are popular varieties planted by farmers. Besides the mentioned advantage before, they are more taste, more shiny and brighter.

CONCLUSION

Rice cultivation can be conducted in polybag media. The rice cultivation in polybag produce higher yield than rice cultivation in lowland. The yield in polybag was two times more than that in the lowland. The rice varieties used are Ciherang and Sertani 12.

LIMITATION AND STUDY FORWARD

The experiment was conducted, and the results obtained were successful. However, more tests can be undertaken to improve the varieties of rice further.

CONFLICT OF INTEREST AND ETHICAL STANDARDS

There is no conflict of interest with the present organization, and no unethical practices followed in experimenting.

ACKNOWLEDGMENT

The authors wish to acknowledge the support provided by IAIN Salatiga and the POMOSDA (Pondok Modern Sumber Daya At-Taqwa), Nganjuk, East Java, Indonesia.

REFERENCES

1. Abugre, S., & C. Oti-Boateng. (2011). Seed source variation and polybag size on early growth of Jatropha curcas, *ARPN Journal of Agricultural and Biological Science, 6*(4), 39-45.
2. Adu-Yeboah, P., Amoah, F., Dwapanyin, A., Opoku-Ameyaw, K., Opoku-Agyeman, M., et al. (2015). Effects of polybag size and seedling age at transplanting on field establishment of cashew (Anacardium occidentale) in Northern Ghana. *American Journal of Experimental Agriculture*, *7*(5), 308–314. https://doi.org/10.9734/AJEA/2015/16122
3. Ginting, J., Damanik, B. S. J., Sitanggang, J. M., & Muluk, C. (2015). Effect of shade, organic materials, and varieties on growth and production of upland rice.*International Journal Of Scientific & Technology Research*, *4*(01), 68–74.
4. Hambali, A., & Lubis, I. (2015). Evaluasi produktivitas beberapa varietas padi.*Buletin Agrohorti*, *3*(2), 137. https://doi.org/10.29244/agrob.3.2.137-145
5. Hatta, M. (2011). Effect of plant spacing types on tillers, yield components, and yield of two varieties of rice in the SRI method. *J. Floratek*, (6), 104–113.
6. Humaerah, A. D. (2013). Budidaya padi (Oryza Sativa) dalam wadah dengan berbagai jenis pupuk pada sistem tanam berbeda.*Jurnal Agribisnis*, *7*(2), 199–210.
7. Onggo, T. M., Kusumiyati, K., & Nurfitriana, A. (2017). Pengaruh penambahan arang sekam dan ukuran polybag terhadap pertumbuhan dan hasil tanaman tomat kultivar 'Valouro' hasil sambung batang. *Kultivasi*, *16*(1). https://doi.org/10.24198/kltv.v16i1.11716
8. Sari, N. Y., Ete, A., & Made, U. (2017). Growth responseof rainfed lowland rice applied with organic matter in the various condition of water availability. *E-J. Agrotekbis*, *5*(1), 53–57.

9. Sarker, U. K., Uddin, M. R., Sarkar, M. A. R., Salam, M. A., & Hasan, A. K. (2017). Physiological parameters and yield differ in rice (*Oryza sativa*L.) cultivars with variable water management systems. *Archives of Agriculture and Environmental Science*, *2*(4), 247–256. https://doi.org/10.26832/24566632.2017.020401

10. Widayat, D., & Purba, C. O. (2015). Productivity and losing yield of Ciherang cultivar rice plant (Oryza sativa L.) on plant spacing combination and different weeding frequency. *Kultivasi*, *14*(1), 17–24. https://doi.org/10.24198/kltv.v14i1.12098

