

# **THE EFFECT OF ORGANIC PLANTING TAPE ON THE INSTRUCTION OF WEEED GROWTH IN RICE (*Oryza sativa* L.) PEATLANDS IN SOUTH SUMATRA REGION**

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**Abstrak:** Sebagian besar wilayah Provinsi Sumatera Selatan seluas 87.017 km<sup>2</sup> merupakan lahan gambut yang tersebar di wilayah timur, mulai dari Kabupaten Musirawas, Muba, OKI, Muara Enim, dan Banyuasin. Sebagian besar merupakan lahan rawa atau sekitar 1,42 juta ha merupakan lahan gambut. Tanaman padi merupakan tanaman pangan utama yang dibudidayakan di Indonesia. Salah satu masalah yang sering dijumpai di lapangan yang sangat berpengaruh terhadap produktivitas padi adalah gulma. Gulma merupakan tanaman pengganggu yang tumbuh di sekitar tanaman budidaya. Hal tersebut melatarbelakangi terciptanya inovasi penanggulangan gulma yaitu dengan menggunakan Pita Tanam Organik (PTO) sebagai media tanam padi. Penelitian ini bertujuan untuk mengetahui pengaruh PTO sebagai penghambat pertumbuhan gulma serta menentukan lebar dan tebal yang optimal untuk menghambat pertumbuhan gulma. Percobaan disusun dalam Rancangan Acak Kelompok (RAK) dengan 3 kelompok dan 5 perlakuan. Kelompok I lebar PTO 20 cm, kelompok II 30 cm, dan kelompok III 40 cm. Sedangkan perlakuan 1 adalah kontrol (tanpa PTO), perlakuan 2 tebal PTO 4 mm, perlakuan 3 tebal 6 mm, dan perlakuan 4 tebal 8 mm. Penelitian ini dilaksanakan pada bulan Juli hingga Agustus 2019 di Desa Mukti Jaya, Kecamatan Muara Telang, Kabupaten Banyuasin. Pengamatan dilakukan selama 40 hari. Data observasi diperoleh dengan analisis varians atau uji F pada taraf 5%. Hasil penelitian menunjukkan bahwa lebar dan tebal PTO berpengaruh terhadap penurunan jumlah gulma dan tinggi gulma. PTO lebar 40 cm dan tebal 8 mm tidak menghasilkan jumlah gulma yang tumbuh. Semakin besar dan tebal PTO, semakin efektif untuk menangani gulma.

**Kata Kunci:** gambut; gulma; pita tanam organik; tanaman padi

**Abstract:** Most of the area of South Sumatra Province covering an area of 87,017 km<sup>2</sup> is peatland spread across the eastern region, starting from Musirawas, Muba, OKI, Muara Enim, and Banyuasin regencies. most of it is swamp land or about 1.42 million ha is peat land. Rice is the main food crop cultivated in Indonesia. One of the problems that are often encountered in the field that greatly affects rice productivity is weeds. Weeds are nuisance plants that grow around cultivated plants. This is the background for the creation of weed control innovations, namely by using Organic Planting Tape (OPT) as a rice planting medium. This study aims to determine the effect of OPT as an inhibitor of weed growth and determine the optimal width and thickness to inhibit weed growth. The experiment was arranged in a Randomized Block

Design (RBD) with 3 groups and 5 treatments. Group I OPT width 20 cm, group II 30 cm, and group III 40 cm. While 1 was control (without OPT), treatment 2 was 4 mm thick, treatment 3 was 6 mm thick, and treatment 4 was 8 mm thick. This research was conducted from July to August 2019 in Mukti Jaya Village, Muara Telang District, Banyuasin Regency. carried out for 40 days. Observation of data obtained by analysis of variance or F test at 5% level. The results showed that the width and thickness of OPT had an effect on decreasing the number of weeds and weeds. OPT 40 cm wide and 8 mm thick did not produce the number of weeds that grew. The bigger and thicker the OPT, the more effective it is to deal with weeds.

**Keywords:** organic planting tape; peat; rice plants; weeds

## INTRODUCTION

Part of the province of South Sumatra covering an area of 87,017 km<sup>2</sup> swamps that are scattered in the eastern part, starting from the districts of Musirawas, Muba, OKI, Muara Enim, and Banyuasin. According to the Directorate General of Irrigation (1998), swampland that has the potential for agriculture in South Sumatra Province is 1,602,490 ha, consisting of 961,000 ha of tidal swampland and 641,490 ha of the non-tidal swamp. Most of the swampland or about 1.42 million ha is peat swampland (Zulfikar, 2006).

Peat soil is defined as soil that is saturated with water and composed of organic soil material in the form of plant remains and decayed plant tissue with a thickness of more than 50 cm (Noor & Heyde, 2007). Peat is a wetland ecosystem characterized by the accumulation of organic matter over a long time. This accumulation occurs due to the slow decomposition compared to the rate of accumulation of organic matter.

Agriculture on peatlands develops starting from the efforts of local communities who live in peat areas daily. Farming on peatlands was originally done naturally, which was very dependent on natural friendliness which sometimes succeeded and sometimes failed miserably; dependence on natural conditions was very high. Local communities in peatlands have no other choice, but to try to empower the peatlands to the best of their ability to fulfil their daily needs by planting crops. Agrarian skills are acquired as a legacy from generation to generation which ultimately encourages local communities to clear land and plant it more widely for daily food such as rice plants (Noor, 2010).

Rice is the main food crop cultivated in Indonesia. In general, rice plants are grown in two systems, namely direct seed planting and transplanting planting. The transplanting rice planting system requires a large amount of water and energy (Djojowasito et al., 2009). Therefore, research and development activities for rice cultivation are directed at the table system (Mustofa et al., 2002).

The table planting system according to Budiono (2006) is still less attractive to the public because several obstacles or weaknesses are encountered including: 1). The seeds are located above the soil surface so that the rows of plants will change randomly due to the blow of rainwater or carried away by irrigation water; 2). If the seed is planted below the soil surface, the plant will die because it is not able to germinate properly; and 3). The pest plant grows faster than the rice plant.

In overcoming the growth of nuisance plants around rice plants, most people tend to use herbicides. One of them is farmers in Mukti Jaya Village, Muara Telang District,

Banyuasin Regency. These farmers have not been able to utilize organic wastes around their environment which can be used to overcome the weeds that grow around the rice plants. The problem above is the background for the creation of an innovation called Organic Planting Tape (OPT) as mulch (soil cover) in the rice planting system. The purpose of making OPT is to reduce the growth of nuisance plants (weeds) which results in decreased rice productivity.

According to Mann et al. (2007) and Riaz et al. (2007), weeds are a serious obstacle to direct seed application for rice cultivation. One of the problems that are often found in the field that greatly affects rice productivity is weeds because weeds are still growing around rice fields which act as a nuisance, causing a decrease in rice production. Some types of weeds that are specific to rice plants are even capable of causing huge yield losses, including; Banto grass (*Leersia hexandra*) 60%, Jajagoan Leutik (*Echinochloa colonum*) and Lamhani (*Paspalum distichum*) 85%, while Jajagoan (*Echinochloa crus-galli*) can reach 100%.

Based on the problems above, Djojowasito et al. (2009) modified the cropping system with OPT to plant rice in paddy fields. OPT is a sheet of organic material in which it is filled with rice seeds between (1-2) seeds at a certain distance. This OPT can be rolled up to make it easier to apply. This planting tape is made with variations in thickness between (1-2) mm and width between (4-8) cm. The raw materials used in the manufacture of OPT are banana stems, water hyacinth stems, and paitan leaves. Water hyacinth is an aquatic weed that needs attention because it grows rapidly and can fill the water surface in a short time. Banana midrib has a fairly good type of fibre and usually, banana midrib will also become agricultural waste after going through the harvesting process.

Besides being a planting aid, OPT is expected to function as mulch that will affect groundwater conditions and weed development. Giving mulch on the soil surface will protect the soil from direct sunlight. Thus the surface temperature of the soil covered with mulch is lower when compared to the surface temperature of the exposed soil (Duppong et al., 2004) so that evaporation of water from the surface of the soil covered with mulch will decrease. Besides being more efficient, OPT can be used as a ground cover to inhibit weed growth. OPT also reduces water evaporation so that the humidity and moisture content of agricultural land is maintained. From the research of Mustofa et al (2002), it is known that OPT has a significant effect on the dry weight of weeds. This is thought to be related to the availability of oxygen and lighting because weed germination is affected by a combination of oxygen supply in the soil and lighting. The results showed that OPT could suppress weed growth.

Based on this background, a study was conducted that aims to determine the effect of OPT as a weed growth inhibitor and determine the optimal width and thickness to inhibit weed growth. The results of the study will be used on agricultural land which is peatland which is commonly found in South Sumatra.

## **METHOD**

This research was conducted from July to September 2019 on the peatland of Mukti Jaya Village, Muara Telang District, Banyuasin Regency. This research belongs to the type of experimental research using the Randomized Block Design method which was carried out as many as 5 treatments in 3 groups. The groups used were planting tape with a length and width of 20 cm, 30 cm, and 40 cm. Then the treatment carried out was the thickness of the planting tape with a thickness of 0 mm, 4 mm, 6 mm, and 8 mm,

respectively. The tools used in this study were scales, rulers, plywood, stove, pan, blender, bucket, and scissors. While the materials used in this study were as follows: water hyacinth, banana midrib, noni leaves, rice seeds, and water.

The work procedures carried out in this study include:

#### 1. OPT manufacturing

The first step to make OPT is by weighing the ingredients that makeup OPT which consists of water hyacinth, banana midrib, and noni leaves. The composition of water hyacinth is higher than the other two ingredients, namely 600 grams of water hyacinth and 400 grams of banana leaf. Then for the bottom layer, the composition is 600 grams of water hyacinth, 200 grams of the banana midrib, and 200 grams of noni leaves. Then the three ingredients are soaked for 24 hours, the goal is to remove the sap (for the top layer do not use *paitan* leaves). After the soaking process is complete, the ingredients that make up the OPT are put into boiling water. This boiling aims to make the three ingredients soft. After the ingredients are soft, put the three ingredients in a blender so that all the ingredients become smooth. Then all the ingredients are mixed, after being mixed well, measure the Ph of all ingredients. After that, enter it into the mould of plywood which has a length and width of 20 cm, 30 cm, and 40 cm, respectively. Respectively, then prints with a thickness of 4 mm, 6 mm, and 8 mm, respectively. After that, the rice planting tape prints are dried in the sun to dry, the bottom layer of the planting tape is softer so it is easier to decompose.

The next step is to give holes to place the rice on the top layer of the tape with a distance of each hole of 10 cm. Then the two layers are put together by sewing the edges to make it longer (adjusted to the length of the land). OPT that is ready is placed on the land that has been prepared with a distance of 5 cm each. The seeds were placed on labile OPT (using noni leaves), then coated with stable OPT (without noni leaves).

#### 2. Rice seeds

The rice seeds used are rice seeds that are ready to be planted, where the rice seeds have gone through the soaking process for 5 days. The type of rice that will be used is *Ciherang* rice.

#### 3. Preparing planting media

The planting medium used is peat soil in rice fields. Then the soil is cleaned of dirt and weeds. Then the ground is levelled so that all the land is evenly distributed.

#### 4. Planting

The method of planting is that the prepared OPT is placed on the prepared soil at a distance of 5 cm each. The seeds were placed on labile OPT (using noni leaves), then coated with stable OPT (without noni leaves). This study was compared with controls (without OPT).

#### 5. Observation

Observations were made after 40 days after planting. The parameters observed are: number of weeds growing around and OPT Height of weeds growing around OPT.

#### 6. Data analysis

To determine whether there is an effect of using OPT on weed inhibition in peat soil, the data were analysed using Analysis of Diversity Prints. To determine the effect between treatments using the F test, namely by comparing the calculated F with the F table. To find out which treatments were significantly different, and then continued with the test of the mean (average) between treatments using the BNJ test carried out on the parameters of the number of weeds that grew and the height of the weeds. Then

furthermore, to find out the difference in the influence of each, a further test of Significant Difference was carried out with a level of 5%.

## RESULTS AND DISCUSSION

Based on the research that has been done on the effect of OPT on the inhibition of weed growth in rice plants on peat soil, the following results were obtained:

### a. Weed amount

From the results of the study, the number of weeds that grow can be seen in diagram 1.

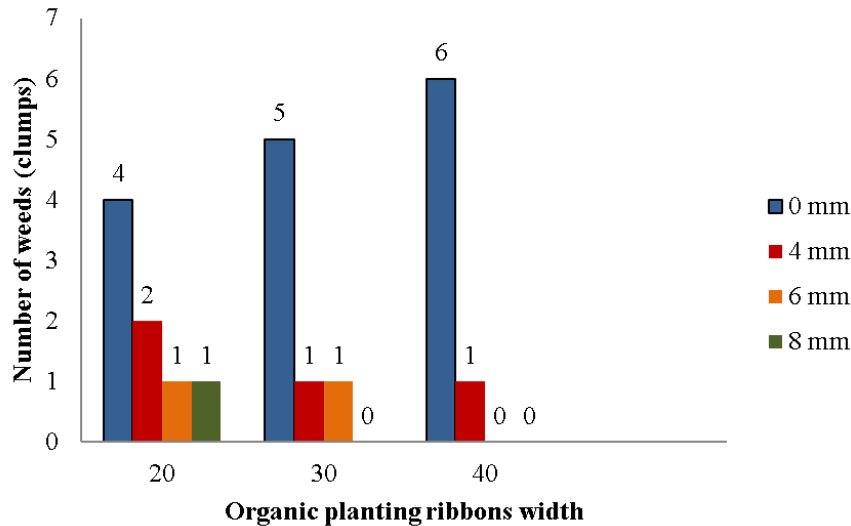


Figure 1. Diagram of weed amount

Based on the data on the number of weeds that have been obtained (Figure 1), then analysis of variance with the RBD pattern was carried out with three groups and four treatments. The results of the analysis are shown in the following table:

Table 1. Analysis of variety Randomized Block Design (RCBD)

SK	DB	JK	KT	F <sub>count</sub>	F <sub>table</sub>	
					5%	1%
Group	2	0,17	0,085	0,13 <sup>tb</sup>	5,14	10,92
Treatment	3	41,67	13,89	22,04**	4,76	9,78
Error	6	3,83	0,63	-	-	-
Total	11	45,67				

KK : 14.8%

Information : \*\*\*= very real difference; tb = not significantly different

Based on the results of the analysis as shown in Table 1 PTO treatment gave a very significant effect on the number of weeds. However, the PTO group did not affect the number of weeds. Furthermore, to determine the difference in the effect of each treatment, further tests were carried out using the Smallest Significant Difference Test (SSDT) at 5% and 1% levels as shown in the Table 2.

Table 2. Least significant difference test effect of use of OPT on total weeds (clumps)

Treatment	Average	K3	K2	K1	K0
P <sub>0</sub>	3	-			
P <sub>1</sub>	1,33	1,67**	-		
P <sub>2</sub>	0,66	2,34**	0,67 <sup>tn</sup>	-	
P <sub>3</sub>	0,33	2,67**	1,00 <sup>tn</sup>	0,33 <sup>tn</sup>	-

SSDT<sub>0,01</sub> = 1,24  
 SSDT<sub>0,05</sub> = 1,56

Information: \*\* = very real difference; tn = not significantly different

Based on Table 2, it can be seen that the effect of the best OPT treatment was obtained at 40 cm wide and 8 mm thick because the effect of the width and thickness of OPT was very significant in inhibiting weed growth.

Observations showed that there was a decrease in the number of weeds in each treatment of OPT thickness, both at a thickness of 4 mm, 6 mm, and a thickness of 8 mm. In the 40 cm, wide OPT group and 8 mm OPT thickness, no weeds were growing. While the width of the OPT is 20 cm and the thickness is OPT 4 mm produces the number of weeds most 2 clumps. The control treatment with the highest number of weeds amounted to 6 clumps. In the wide OPT treatment, it shows that the wider the OPT, the more inhibited weed growth. This is due to the lack of oxygen supply and lighting so that weed growth is inhibited. As stated by Nathan & Van Ackher (2004), which states that weed germination is also affected by a combination of oxygen supply in the soil and lighting.

The soil will be covered by OPT so that the germination process will be inhibited and the energy used by weeds for photosynthesis is reduced. This is by the statement of Sutopo (2002), who stated that during the germination process the respiration process will increase accompanied by increased oxygen uptake and release of carbon dioxide, water, and energy. Limited oxygen that can be used will result in inhibition of the germination process.

For rice plants, giving OPT can be fertile, because OPT is composed of organic materials, namely banana stems, water hyacinth, and *paitan* leaves. These materials contain nitrogen nutrients needed by plants for physiological and metabolic processes in plants that will trigger plant growth. The wider and thicker the OPT used, the better the condition of the plant without disturbing its growth and metabolic processes. This is by the statement of Sugiarti (2011), which suggests that in the banana midrib there are important elements needed by plants such as nitrogen (N), phosphorus (P), and potassium (K). The banana midrib is rich in glucose and cellulose content but low in lignin content. Glucose is one of the most important carbohydrates used as a source of energy for plants.

b. Weed height

Data from the research on the height of weeds can be seen in the Figure 2.

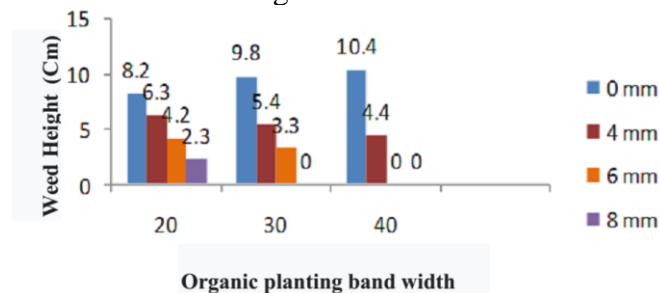


Figure 2. Diagram of weed height

Based on the data on high yields of weeds that have been obtained (Figure 2), analysis of variance was then carried out with the Randomized Block Design (RBD) pattern of three groups and four treatments. The results of the analysis are shown in the Table 3.

Table 3. Analysis of variety according to randomized block design (RBD)

SK	DB	JK	KT	F <sub>count</sub>	F <sub>table</sub>	
					5%	1%
Group	2	4,87	2,435	1,14 <sup>tb</sup>	5,14	10,92
Treatment	3	130,07	43,35	20,35**	4,76	9,78
Error	6	12,83	2,13	-	-	-
Total	11	45,67				

KK : 8%  
Information : \*\*\*= very real difference; tb = not significantly different

Based on the results of the analysis as shown in Table 3 OPT treatment had a very significant effect on weed height. However, the OPT group did not affect weed height. Furthermore, to determine the difference in the effect of each treatment, further tests were carried out using the Honestly Significant Difference Test (HSDT) at 5% and 1% levels as shown in the Table 4.

Table 4. Honestly Significant Difference Test (HSDT) effect of use of OPT on weed height (clump)

Treatment	Average	K3	K2	K1	K0
P <sub>0</sub>	9,46	-			
P <sub>1</sub>	5,36	4,10*	-		
P <sub>2</sub>	2,5	6,96**	2,86 <sup>tn</sup>	-	
P <sub>3</sub>	0,76	8,70**	4,60*	1,74 <sup>tn</sup>	-

HSDT<sub>0,01</sub> = 5,06

HSDT<sub>0,05</sub> = 3,52

Information: \* = significantly different; \*\* = very real difference; tn = not significantly different

Based on Table 4, it can be seen that the effect of the best OPT treatment was obtained at 40 cm wide and 8 mm thick because the effect of the width and thickness of OPT was very significant on the inhibition of weed growth.

The provision of thickness and width of OPT affects the growth of the average height of weeds. The real difference can be seen in Figure 2 where the height growth of the control weeds was higher than the growth of weeds treated with several sizes of OPT, where the height of the weeds in the control treatment was 10.4 cm. Giving OPT affects the height of weeds. At the height of weeds, various results were obtained where the height showed the effectiveness of OPT on weed height.

Based on the research, the real effect of OPT on weed growth occurred in all parameters. Overall, the lowest number of weeds in each parameter was in the 40 cm wide and 8 mm thick treatment group. It can be seen from the width and thickness of OPT given to plants. The wider and thicker the OPT, the supply of oxygen and lighting will decrease so that it can inhibit the growth of the weed itself.

From Figure 2 it can be seen that the control has a higher average weed height than the treatment using OPT. This is because the soil is not covered by OPT so that the mechanical resistance of OPT is smaller than the soil covered by OPT. This is by the research of Nurwahyuningsih (2013) which stated that weed growth without using OPT (control) germinated faster than using OPT. This is because weed growth without using organic planting bands (control) does not get mechanical barriers from the outside, while

those using organic planting bands get obstacles from the outside caused by organic planting bands themselves, so that weed growth is inhibited.

## CONCLUSION

Based on the results of research conducted, the conclusions are the treatment with the addition of OPT gave a significant effect on the inhibition of weed growth compared to the treatment without using OPT (control) and the optimum width and thickness that can inhibit weed growth are 40 cm wide and 8 mm thick where at that size no weeds are growing.

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