Appropriate Technology Applications Rice Weed Wover Tool in Kenagarian Sungai Duo

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Abstract. This community service activity aims to overcome problems and assist farmers in the process of handling rice. From the results of the initial review of the service team in the Sungai Duo area, there are several problems or problems faced by rice farmers. Problems faced by farmers in weeding activities. Weeds, which are pests in the form of wild plants among rice plants, are a threat to the growth and development of rice. Usually farmers overcome this problem by pulling out weeds manually, no machine has ever been known to farmers to overcome the weed problem. This activity requires a lot of energy and a long time. This complaint is a problem that will be given a solution. Through this dedication activity, the dedication team offers innovations in making weed removal equipment using machines. The science and technology offered in this activity is the use of a 55 cc engine as a wheel barrow and will be transmitted on a blade designed to eradicate rice weeds. Weed weeding machine innovations were made in a fabrication workshop majoring in Mechanical Engineering, Faculty of Engineering, Universitas Negeri Padang. Making machines involves students to help the service team in carrying out this activity. From the results of the analysis of innovation weed weeding machines are able to do weeding sugar quickly which is 1 Ha within 2 hours. The results of this innovation were handed over to the target audience, namely farmer groups in the Sungai Duo area of Sitiung District, Dharmasraya Regency. In the handover activity of the religion and farmer groups, they were very happy to welcome this tool. Farmers say thank you for the innovation and attention of universities to the people who are far from the center of the provincial capital.

1. Introduction
Optimization of rice productivity in paddy fields is one of the opportunities to increase national grain production. This is very possible when associated with rice yield in this agroecosystem is still diverse between locations. The average yield is 4.7 tons / ha, while the potential can reach 6-7 tons / ha [1]. The reason for the low rice production in Indonesia is one of them because in general farmers still cultivate rice not in accordance with the rules, such as land management and fertilizer dosing not in accordance with the recommended provisions and still dominating farmers using conventional systems. Indonesia's rice production is still insufficient to meet the food needs of its people. This can be seen in 2018 Indonesia imports 750 thousand tons of rice to meet national rice needs [2]. The Ministry of Agriculture and the Central Statistics Agency (BPS) in 2017
predict that rice production in 2018 will increase by 3.74 million tons or around 4.97 percent compared to last year. In 2018 rice production is estimated at 79.14 million tons, while in 2019 there are 75.39 million tons [2].

The development of agricultural land as an appropriate alternative is by means of agricultural intensification. In an effort to increase rice production, it is necessary to find the right method implemented by farmers. One suitable method is to adjust the spacing of rice and to eliminate pests continuously. One of the problems farmers often face is the problem of weeds in rice farms. Weed is a small grass that grows between rice plants. Weeds that grow in the post-rice garden. This weed can inhibit the growth of rice. In normal conditions, farmers eradicate weeds by using pesticides and removing them by hand manually. The extent of paddy fields is sometimes uneven activities can be done. As the application of appropriate technology the devotion team wants to make a weed eradication machine. This machine is designed using a 55 cc petrol motor. Farmers can use this machine to get rid of weeds quickly and efficiently. This dedication activity is planning two appropriate technology tools that will be intended for farmers in the Dharmasraya border area. It is hoped that the food crisis which will be responded to by importing rice will not happen again. Farmers can increase their yields by using technology in agriculture. Rice is a Gramineae plant group with stems composed of several segments.

The segments are curves or empty spaces. The length of each segment is not the same length, the shortest segment is at the base of the stem. The second, third and so on segments are longer than the segments below it. The growth of rice stems is a clump, where there is a single stem or main stem that has buds. The distinctive feature of rice leaves is the presence of scales / looks like feathers and leaf ears. This is why rice leaves can be distinguished from other types of grass [3].

1.1. Terms for Growing Rice Plants
Rice can grow in areas that have moderate to high temperatures with long sunlight intensity. The average temperature suitable for rice plants ranges from 68 C - 100 C. Temperature is the main requirement that must be considered in rice cultivation because low temperatures on the growth of rice plants will slow seed germination and delay the process of transplanting or transfer to the field [4].

Rice plants need good rainfall, which is an average of 200 mm / month. Good rainfall will have a good impact on irrigation, so that the water puddles needed by rice paddy plants can be fulfilled and plants can grow both in the vegetative and generative phases. Good temperature for the growth of rice plants is 330C and above, whereas in Indonesia the influence of temperature is not too pronounced because the temperature is almost constant / stable throughout the year. As for one of the effects of temperature on rice plants is the void in seeds [3].

1.2. Rice Plant Weed
In the cultivation of plants both on land and paddy fields often grow wild plants that grow by themselves aka wild plants. The presence of wild plants/plants on cultivated plants can cause competition, both competition in getting nutrients in the soil or in getting sunlight. Wild plants/plants are of course undesirable because they can interfere with cultivation. Disturbing plants are usually in the form of various types of grass and other plants besides the main plant called weeds. Thus, the definition of weeds is all types of plants or plants that grow wild on cultivated plants (main plants) whose existence is undesirable because it can interfere with plant growth and can cause a decrease in the yield of cultivated plants (main crops).

Weeds that are often found in lowland rice fields generally have a character that is resistant to water and drought. That is, weeds in paddy fields have the ability to adapt well to all conditions that occur in paddy fields. Naturally weeds thrive faster than cultivated plants. Therefore, questions often arise among rice farmers; why are weeds more fertile than rice? In general, weeds in lowland rice fields can be classified into 2, namely broadleaf weeds and narrowleaf weeds. The following are various types of rice grass, grass medicine for rice, herbal medicine to eradicate grass in paddy fields and ways to eradicate weeds in rice plants; (1) broadleaf weeds, for example rice hyacinth, genjer, authority / rice hyacinth, kiambang / kayambang, (2) narrow leaf weeds, for example puzzles, banto grass, jawan or grains of grass (grass similar to rice plants).
1.3. Development of Weed Handling Technology

Weeding or cleaning weeds on rice plants is an activity of pulling weeds (weeds) that are in between the sidelines of rice and at the same time soften the soil. Weeding is done three times, namely when the rice is 9-35 days after the rice is planted in the paddy field. One of the factors that caused the low yield of both quality and quantity of rice is weed disturbance. Weeds as plant pests (OPT): including important obstacles that must be overcome in increasing rice production in Indonesia [5]. Weeds are one of the limiting factors in rice production, because weeds can absorb nutrients and water faster than staple crops. The cost of weed control in rice plants reaches 50% of the total cost of production. Weeds reduce crop yields in competition for light, oxygen, and CO2, as well as food [3]. The decline in crop yields is due to weeds can reduce growth activities such as stunted plant growth, chlorosis occurs, nutrient deficiencies, and a reduction in the number and size of plant organs. Symptoms of nutrient deficiency in rice plants can result in total failure of seedlings, late growth of plants, symptoms on leaves that are characteristic, and abnormalities that arise in plant tissue [5].

At this time the farmers weed weeds by hand or with manual weeder tools such as osmosis. This method requires a lot of time, money, energy, and quite boring. Even though after the rice is planted, the farmers also want to take a rest, not having to keep working in the fields. Moreover, young farmers prefer to work in factories, construction workers, trading, and other businesses with more certain results with low risk. Planting time simultaneously causes an increase in labor in the same period, resulting in competition in the fulfillment of labor. This is due to the limited workforce, or because of heavy rain coming continuously, so weeding is often delayed.

Spending of labor for the first and second weeding depends on the density of weeds in each plot, ranging from 25 - 35 each work day and 15-25 work days. While the total flow of labor in a planting season ranges from 40 - 60 people. If the worker's wage is Rp. 15,000 per day means that during one crop season we need a weeding fee of between Rp. 600,000 to Rp. 900,000 per Ha [5].

Figure 1. The Design of Weed Billing Machines

In this design weeding machine uses a wheel that serves as a weed destroyer. This engine is driven by a 55 cc gasoline engine. Operator can adjust the speed of this engine by setting fuel consumption that is placed on the steering lever.

2. Method

The method of applying science and technology used in this activity is to analyze problems and design weed eradication machines. This method is adapted to the schematic problem-solving framework.

Problems arise due to various factors, the target audience is the farmer group. In accordance with the objectives to be achieved in this activity is to produce farmers who are skilled and responsive to appropriate technology and at the same time have motivation, the method applied is to provide direct training to farmers to operate weed eradication machines.
The application of science and technology is carried out by providing demonstrations and direct application in the field on how to carry out the process of operating weed eradication machines, farmers will also be given an explanation of the standard of safety that must be known by farmers in operating a weed exterminator.

3. Result
3.1 Tool Design and Manufacturing Process
3.1.1. Weed Processing Machine
Weed weeding machines were made in the Fabrication workshop of the Department of Mechanical Engineering FT UNP. In the process of making the devotion TEAM tools involved two students. Benefits for students who take part in this activity can be a final project which is one of the requirements for completing the full range of student diploma education.

The design process is done using a solidwork application. Work drawings are carried out by students. In weed eradication machines, the engine design uses a 45 cc gasoline motor with a rotating arm as well as a lawn mower.

![Figure 2. Method of Implementation](image)

![Figure 3. Design of weed weeders](image)
3.1.2. Weed Making Machine
The basic concept of this weed buffer is a wheel made with a certain size so that it will leave footprints on the land to be planted with rice. The wheels are made with iron strips of width 20 mm and thickness of 4 mm. Iron strips on rollers with a diameter of 40 cm ... here is a picture of making weed weeders.

3.1.2.1. Weed Wheel Manufacturing
Weed comb wheel is the main component that becomes a weed exterminator. These wheels are made with 12 mm begol iron with 15 cm wheel width. On this wheel is equipped with weed grass comb nails. The grass that was run over by the wheel will immediately be destroyed and sink to the ground. The following is the shape of the comb wheel.

![Figure 4. The comb wheel on the weed buffer](image1)

3.1.2.2. Ordering
Transmission on weed machines using a chain system. The chain used is a type of motorcycle chain. The following is the form of transmission system used.

![Figure 5. Process of Ordering](image2)

3.1.2.3. The Process of Making a Transmission System
Transmission on weed machines using a chain system. The chain used is a type of motorcycle chain. The following is the form of transmission system used.

![Figure 6. Transmission System](image3)
3.1.2.4. Finishing Process
This finishing process is the grinding process of all components and the painting process. The colors used are orange and black. Here is a photo of the physics process.

![Figure 7. Transmission Cap Painting](image.jpg)  ![Figure 8. Finishing Process Results](image.jpg)

4. Discussion
The implementation of this community service has arrived at the handover process with the target audience, namely farmer groups in the Sungai Duo district of Sitiung sub-district, Dharmasraya Regency. In this handover activity the farmer group and the agricultural instrument welcomed with joy. Farmers are very pleased with the innovation in the weed weeding process, which so far has only been done manually.

Usually for a hectare of paddy fields takes 2 days with a workforce of 6-8 people. Given this style, the estimation is that this tool is able to do weeding work on 1 Ha of paddy fields with a time of 5 hours with an average engine speed of 5 km / hour. Fuel needed within 5 hours of operation of the engine + 3 liters. The cost of weeding manually when compared to this machine is very much different. It is hoped that this innovation can increase the productivity of farmers in the Sungai Duo district of Sitiung District, Dharmasraya Regency. The following is the documentation of the handover process with the farmer groups and the agricultural tools.

![Figure 9. The Handover Process with Sungai Duo Nagari Guardians](image.jpg)
5. Conclusion
The conclusion are Community service activities carried out in Kenagarian Sungai Duo, Sitiung District, Dharmasraya Regency are based on farmers' problems in dealing with rice weed pests in the fields, innovations made on weeding machines are made in accordance with the constructs and needs of farmers and weed weeding machines are very petrified by the work of farmers in dealing with weed pests.

6. References
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