Received 2023-09-22
Received in revised from 2023-10-09
Accepted 2024-05-14
Available online 2024-06-25

Application of two-lever baglog pressing machine technology to improve the production of oyster mushroom cultivation

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Abstract

The baglog pressing process in the Ngadi Oyster Mushroom Cultivation Community Group in Gunungronggo Village is still done manually, by compressing the media in a plastic bag with a bottle or plastic pipe several times until it is solid. This work requires quite a lot of labor and a long time. The level of success of this process really depends on the skills and accuracy of the workers. The results of compacting the media in this way are sometimes unsatisfactory, because there are still air spaces in the media, so oyster mushrooms cannot grow. Problems that can be identified in SMEs are the division of labor duties for the printing and steaming processes, as well as the lack of experienced workers who can compact baglog properly. So it is necessary to apply a two-lever baglog pressing machine which aims to increase production capacity. The results of the activity show an increase in baglog production capacity, from 60 baglog/day with 2 workers to 300 baglog/day with a baglog press machine, with a printing process time of 5 hours/day. Production increased 500% compared to before using the tool. This capacity meets the needs for the steaming process, where the steamer capacity owned by SMEs is 215 baglogs/process/day.

Keywords: *Baglog, Oyster Mushroom, Press, Two-lever.*

INTRODUCTION

Oyster mushrooms need a medium for the growth process. Baglog is a growing medium for oyster mushrooms that cultivated. The baglog must made as dense as possible to accommodate optimal water storage.

Baglog compaction aims to obtain a denser and more homogeneous volume, the ability to absorb water increases, and it can continue to be used continuously even after the harvest period (Fadhila et al., 2020; Rizaldi et al., 2019). On the other hand, baglog that is not dense will result in a poor mushroom growing medium because the nutritional content is not homogeneous. It will cause the growth of oyster mushroom mecelium to be uneven, even if it grows it will have an unfavorable effect on the morphology of the mushroom, resulting in low quantity and quality of the oyster mushroom harvest (Kahandage et al., 2016).

The baglog pressing process by conventional methods, rely on human power so that the baglog production capacity is not measured accurately (Yeny and Diah, 2017). The process of compacting the growth media for oyster mushrooms is carried out by workers manually by compressing the media (sawdust, bran, lime and corn cobs) in a plastic bag with a bottle or plastic pipe several times until it is solid. The level of success depends on the skill and accuracy of the user. The results obtained are baglog sometimes less dense, requires stronger and more skilled labor, and the compaction time takes a long time. Oyster mushroom growth media that are less compressible result in uneven mycelium growth, slow growth of oyster mushrooms, and the shape of white oyster mushrooms that grow less well, and this results in the quantity and quality of the mushrooms produced (Sariasih, 2013).

Increasing the number of workers will be ineffective because prospective workers must fully understand the proper technique for compacting oyster mushroom growth media. Meanwhile, the key to success in developing oyster mushroom seeds is the quality of baglog or oyster mushroom growth media which is determined by the media material and media density (Sutarman, 2012).

The solution to solving the problem of needing reliable, fast and precise workers in compressing oyster mushroom growth media, can be replaced with machines. The use of machines is a solution to increase agricultural productivity and efficiency, improve product quality and added value, and empower farmers (Aldillah, 2016). The purpose of machines in agriculture is to facilitate and speed up human work in the agricultural production process (Handaka and Prabowo, 2013). Agricultural

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mechanization is expected to increase the efficiency of human labor and the farmer's economy, as well as the quantity and quality of agricultural production (Subagiyo, 2016).

The application of a baglog pressing machine is needed for a good process of compacting the oyster mushroom planting media, so it can increase the quality and quantity of the development of oyster mushroom cultivation. The baglog pressing machine/two-lever oyster mushroom growth media is designed to apply pressure to the oyster mushroom growth media so that the oyster mushroom or baglog growth media has the right density so as to maximize time and production so as to increase oyster mushroom yields (Husna et al., 2015) . So the aim of community service activities in the Ngadi oyster mushroom cultivation community group, Gunungronggo Village, Tajinan District, Malang Regency is to provide education and technical solutions for compacting oyster mushroom growth media quickly and precisely, so it can increase the productivity and quality of the oyster mushrooms produced.

MATERIAL AND METHOD

The materials used are plastic measuring 35 x 18 cm, bottle caps, oyster mushroom media consisting of sawdust, lime, gypsum, bran, water as moisture for the planting medium, EM4, and sugar cane juice. The methodology used in this research was to design an oyster mushroom baglog press machine (Figure 1). The design of the baglog press machine consists of the components of the lower frame, upper frame, drive disc, upper pounding rod, lower pounding rod, and baglog clamp (Suryanto, et al., 2014; Azmy, et al., 2023). The underframe component consists of a construction made from a structure of steel rods, and plates which are assembled and then connected. The upper frame is supported by sub-assembly components such as the upper frame rod, iron pipe supporting the pounding rod, iron pipe supporting the baglog tube, motor mount, gear reducer mount, and bearing mount. The drive disc component is made of ST 37 steel, functions as a transmitter of rotation from the drive shaft to the pounding rod and changes the rotation mechanism into an up and down mechanism for the pounding tool (Saripuddin, et al., 2022). There are 2 pounding rod components, an upper pounding rod and a lower pounding rod. This pounding rod is an important part to facilitate the pounding force that occurs from the mechanical system that has been designed so that the pounding rod is a quite critical part (Piter, et al., 2020). The baglog clamp component functions as a place for baglog that has been packaged in plastic for the pounding process (Erwanto, et al., 2021). Components in the clamp are consist of the right and left clamp, clevis pin, and split pin. This baglog clamp also plays a role in the final stage of the baglog compaction process by utilizing the pounding and pressing process that occurs so that a homogeneous and dense oyster mushroom baglog can produced. This machine is equipped with an intake funnel to facilitate the process of inserting baglog material into the plastic media which is clamped by a clamp component.

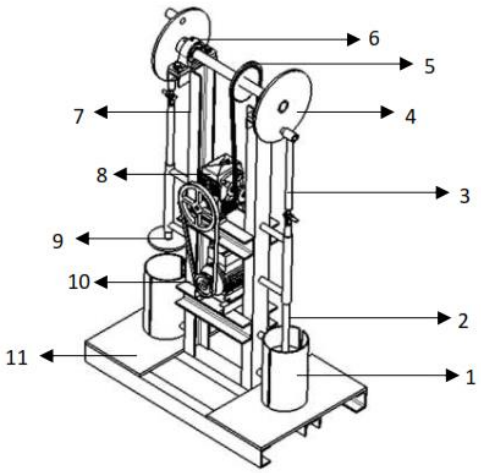

Figure 1. *Baglog press machne design*

Annotation :

1. Cylinder as baglog press tube
2. Lower pounding rod
3. Top pounding rod
4. The drive disc acts as a pusher for the pressure ring up and down
5. Gear
6. Bearings, to reduce friction from the iron shaft
7. U channel iron as the main frame
8. Gearbox as a tool for transmitting mechanical energy from an electric motor
9. Pressure ring as a baglog press
10. Electric motors convert electrical energy into mechanical energy
11. Press machine stand

RESULT AND DISCUSSION

The baglog press machine design has specifications for engine dimensions of 80 x 50 x 150 cm, driving power ¼ HP, gear box ratio 1:20, rotation 9 rpm. The working principle of the mushroom baglog press machine is pressing or pressing the material

automatically using an electric motor. This baglog press machine design can operate with the help of a drive motor, which rotates the gearbox along with the pulley and belt. The gearbox will rotate the drive shaft, it is connected to the sprocket and chain to continue the rotation (Sulaksono and Yani, 2022). This shaft will also continue the drive disc rotation, due to change the rotation mechanism into an up-and-down stroke of the engine's pounding rod. The pounding rod will transmit the force from the driving disc to the baglog pounding rod. The baglog pounder component can produce an up-and-down mechanical movement, which functions for the oyster mushroom baglog compaction process. The press machine mechanism is by placing a plastic bag on the filling cylinder, the material of baglog inserted through the intake funnel, then pressing the touch switch, and the machine will operate by pressing and compacting the baglog alternately in each cylinder. Machine testing is carried out to determine the working time and ability of the machine to compact the growth medium for oyster mushrooms or baglog with the right density (Fig. 2).

Figure 2. *Two=lwvwr baglog press machine*

The process of filling the baglog material and pressing takes approximately 2 minutes. The estimated production capacity of baglog oyster mushrooms per day is Equation 1 (Arum et al., 2022).

$$x = \frac{60}{t} x\ p\ x\ 2 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

where x = baglog production capacity per day (baglog), t = time needed to press mushroom baglog (minutes), p = number of working hours operating the machine per day (hours), 60 = number of minutes in 1 hour, 2 = number of baglog pressing levers on the baglog pressing machine. The number of working hours per day is 5 hours, and the pressing time lasts 2 minutes, so the production capacity per day is 300 baglogs. If in 1 month there are 25 working days, then in 1 month you get 7,500 baglogs.

The manually pressing baglogs with two workers produces 60 baglogs per day or 1,500 baglogs per month with 25 of working days. Baglog production using a two-lever baglog press machine produces 300 baglogs per day or 7,500 baglogs per month. Production increased 500% compared to before using the machine. This capacity meets the needs for the baglog sterilization process, where the partner's steamer machine capacity is 215 baglogs/process/day. The successful implementation of the baglog press machine can be seen in Table 1 below:

Table 1. Results of the implementation of the baglog press machine

No	Kriteria	Sebelum implementasi	Setelah implementasi
1	Production lay-outing	Not good, there is still a lot of equipment used during the production process scattered in the work area	Good, the work area is focused in one place so it is neater and better structured
2	Safety at work	Safe enough	It is safe, the machine is properly closed, reducing the possibility of media debris hitting workers
3	Ease of operation of tools and machines	Eassy	Eassy
4	Long production time	1 baglog/ 10 minute/worker	2 baglog/ 2 minute
5	Worker fatigue level	The production process takes quite a long time and requires quite a lot of energy	The production process is assisted by machines so it can be faster, it just requires skilled personnel to carry out this process
6	Ease of maintenance of tools and machines	Eassy	Eassy
7	Production capacity	6 baglog/hours	60 baglog/hours
8	Density level	Depends on worker skills	Can be arranged according to needs

IMPACT OF ACTIVITIES

Community service activities in the Ngadi oyster mushroom cultivation community group in Gunungronggo Village, Tajinan District, Malang Regency, with implementing a baglog press machine have had a positive impact where baglog production has increased so that it can meet the needs of the baglog sterilization process and the production capacity of oyster mushroom cultivation.

CONCLUSION AND SUGGESTION

The implementation of a 2-lever baglog press machine in the Ngadi Oyster Mushroom Cultivation Community Group, Gunungronggo Village, Tajinan District, Malang Regency, can achieve the target of growing media for oyster mushroom seeds of 300 baglogs/day or 7,500 baglogs/month. Production increased 500% compared to before using the machine. Using a baglog press machine is more efficient in time, because the production time using a machine is 2 baglogs/2 minutes, while manual pressing takes 1 baglog/10 minutes/worker. So, it requires a lot of workers to meet the target demand for oyster mushroom media. The baglog density on the baglog press machine can be adjusted, because on the pressing ring there is a drad that can be rotate. The rotation of the drad will cause the pressing height can be adjusted.

ACKNOWLEDGEMENT

The authors are gratitude to the service funder, the Institute for Research and Community Service (LP2M) Universitas Brawijaya, which has funded the 1000 Village Strategic Grant activities for oyster mushroom farmers in Tajinan District, Malang Regency, East Java.

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