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Utilization of Vacuum Pump in Harvesting Process of Stingless Bee Honey for Empowerment of Honey Farmer Community.

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ABSTRACT

The process of harvesting stingless bee honey requires special tools, the use of vacuum pumps as a harvesting medium makes it easier for farmers, saves time, and maintains honey quality. The purpose of this service is to provide training to the community on how to use a honey harvesting tool with a vacuum pump with a capacity of 7 liters/minute, the assembly process and maintenance. From the results of the service that has been carried out for beekeepers in Pulo Meria Village, it is found that the honey suction tool from the Vacuum pump is very useful for farmers, easy to use, production capacity of 1 liter per hour and portable. The difference in the amount of capacity is due to the different honey harvesting process due to having different sized honey bags and different honeycomb contours. From the empowerment of the honey farming community, it was found that 89% of the farmers got better quality honey harvests and increased honey production by 57% more.

1. Introduction

Honey is a high-value agricultural product that has three benefits at once, namely as a source of nutrition, health ingredients, and cosmetic ingredients [7]. Kelulut (Meliponini) honey cultivation in Aceh is gaining interest from the community. Linot honey cultivation business does not require large capital and is easy. From the results of the service that has been carried out by Muhammad et al 2021, it shows that the community's interest in this business is growing even though it is not significant. The formation of several cultivation groups shows that community interest is good and donor agencies are also interested in developing this business as an effort to carry out the mission of improving people's lives. Honey cultivation must be balanced with the availability of feed, the use of harvesting technology and product packaging in accordance with market desires [2].

The quality of honey products is determined by the use of harvesting tools because it affects the quality of honey, Rosawanti et al. (2022) mentioned that one of the efforts to maintain the quality of honey products is the use of modified honey harvesting tools with the aim of increasing the quantity

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and quality of honey products [8]. Susilawati et al. (2022) explained that improving the quality of harvesting tools is the most important part of honey cultivation activities in addition to colony domestication techniques and honey product packaging [10]. The harvesting process of kelulut honey is different from bee honey, because it uses a vacuum pump or diaphragm pump. While the wasp bee honey uses a squeezer.

The harvesting process of linot honey is influenced by the viscosity of honey, which for kelulut honey has 198.8 cP for yellow honey and 253.4 cP for black honey (Muhammad Idkham et.al). The harvesting process by farmers has been using injecting equipment [3]. For small capacities this can be done but for cultivation scale this can reduce production. For a large scale, more effective tools are needed. Farmers' knowledge about the harvesting process of linot honey is still very low and is a question in the community because the contours of the hive are different from wasp honey which has honey bags like eggs so that special tools are needed in the form of a suction machine.

The design of a honey suction device using a sock drat dynamo has been carried out by (Edi Syahputra et al 2024) with 160 Psi and speed controller has a frame dimension of 32 cm high, 24 cm wide [11]. The results of the development of the suction device can operate smoothly. The benefits resulting from this tool, able to suck honeycomb with a size of 40 cm x 40 cm and the size of the honey container bottle is enlarged 800 ml.

The previous service for the development of linot honey cultivation in the A Bee Honey group by Muhammad et.al 2022 caused the farmers to want training on harvesting and harvesting tools for the group.

The lack of understanding of the linot honey suction machine during harvesting results in damage to honeycombs and minimal yields. Based on the results of discussions with the group leader and members, there is a desire to develop linot honey harvesting technology in the form of providing linot honey suction machines for the community. There are two types of honey suction pumps: electric and vacuum. The difference between the two is the way of working and the construction of the tool. The use of electric pumps has been practiced by Edy S. Et All (2022) [9].

The use of electric pumps as a honey harvesting tool has been tested by Muhammad Idkham et al which shows that the tool can work well in harvesting. Electric pumps work to suck and distribute fluid through valutes, impellers or diaphragms, inlet in the form of honey and outlite beruoa fluid or honey, Vacuum Pumps work to suck air from the tube through the suction channel, the tube consists of two channels, namely the inlet to suck fluid and the outlet for the channel connected to the vacuum pump [9]. The air is sucked by the vacuum pump from the tube, then the suction pipe from the tube is inserted into the fluid so that the fluid flows into the tube without passing through the pump.

Honey harvested with an electric pump will pass through the pump valute, causing contamination with the electric pump material. From this and based on observations, for the honey harvesting process, a suction device is needed without using a vacuum pump where the suctioned honey does not pass through the pump but goes directly into the collection tube so that there is no contamination with the pumping equipment. We adopted this model from the vacuum bagging process in the composite manufacturing process. This model can work on high viscosity fluids such as epoxy resin [1].

2. Methodology

2.1 Empowering Honey Farmer

The training method used is the development method or R&D (research and development). According to Sugiyono (2016), this is reinforced by the statement of Astriawati et al. (2022) that this

method consists of the stages of planning, action, observation and reflection . and Adi Bejo Suwardi et al. (2021) emphasize that the technology applications offered to target partners must be able to answer crucial community problems, while Junaidi et al. (2021) consider that technology transfer activities must contribute to improving the quality of life and income of the community.

2.1 Partner and Tools

USAID Segar Aceh, A Bee Honey, Care Engineer Team and Members of Faculty Egineering, Universitas Malikussaleh. The utilized of Vacuum Pump developed by Care Engineer Team with schematic procedure as shown in figure 1.

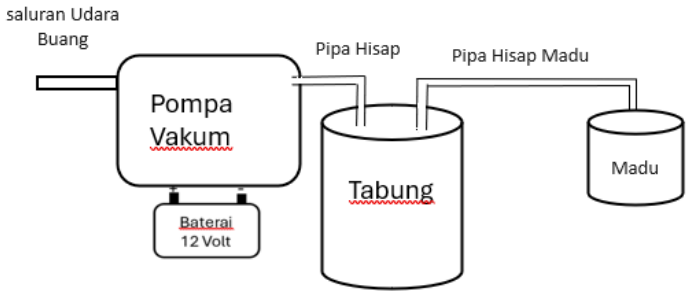

Fig. 1. Schematic figure of vacuum pump for honey harvesting.

3. Activities, Results and Discussion

3.1 Activities

Training activities were carried out in Pulo Meria Village with participants from the community who were interested in linot cultivation. The process of introducing tools was carried out in the village meunasah and then practicing directly to the honey harvesting location. The enthusiasm of the participants was very good as seen from their attendance at the location and their curiosity about the harvesting process that had not been understood.

The training process starts from explaining the function of each component and how the vacuum pump, battery, suction and exhaust hose and tube work. Assembly process and maintenance. Initial practice using water media which produces a suction time of 500 ml with 5 minutes. Figure 2 Shows the activites of honey farmers training at the location.

Fig 2. Activities of Empowerment honey farmer at Pulo Meria

After practicing by the pengabdi, a participant was asked to try the use of the tool. Furthermore, participants were invited directly to the cultivation site to practice the process of taking linot honey using the suction machine. Pengabdi practiced how to harvest, starting from opening the toping, perforating the honey bag and suctioning.

To avoid being swarmed by bees, the topping was moved to a safe place and the vacuuming process was carried out. All participants were given the opportunity to practice and pay close attention to the process. Participants were very enthusiastic and could understand that the process of harvesting linot honey is very easy and fun. In the linot honey suction process, it turns out that the production capacity is different, namely for 500 ml, it takes 20-30 minutes. This is because the honey suction process cannot be continuous because the suction process is for each bag of honey. The difference in mandu bag size also greatly affects the time and capacity.

a b

Fig 3. Honey pocket (a) before harvesting and (b) after harvesting by vacuum pump.

After completing the training, the team provided assistance to the cultivation group by conducting monitooring to the location. Assisting with bee colony provision and monitoring bee colony development. For the initial learning process, pengabdi placed 5 bee colonies as learning materials for the group.

3.2 Post Practice Assesment

A group of honey farmer participated in a training program designed to equip them with the knowledge and skills necessary to effectively utilize vacuum pump harvesters. Following the training, data was collected on honey quality and production metrics for the participating beekeepers. Figure 3 Shows the satisfaction of honey farmer in post assesment of training.

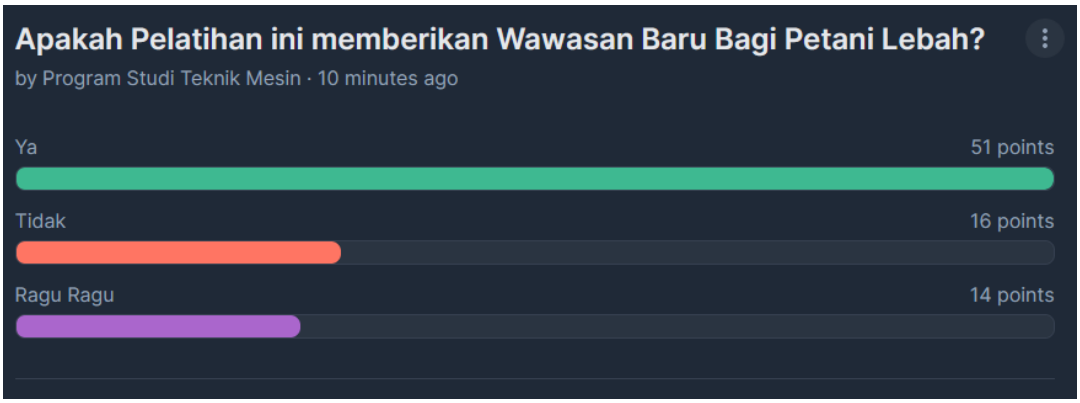

Fig 4. Quick assesment result of participants

The study yielded encouraging results. Post-training, 89% of honey farmers reported noticeable improvements in honey quality. Additionally, a significant 57% increase in honey production was observed among participating honey farmers.

These findings suggest that vacuum pump harvester training can be a powerful tool for beekeepers seeking to enhance their operations. The observed improvements in honey quality likely stem from the gentle nature of vacuum harvesting, which minimizes hive damage and reduces contamination. The increased production may be attributed to improved harvesting efficiency and potentially, reduced stress on the bee colonies.

4. Conclusions

The positive outcomes of this study highlight the potential of vacuum pump harvesters as a valuable technology for beekeepers. By incorporating vacuum pump harvesters and participating in relevant training programs, beekeepers can potentially achieve significant improvements in both honey quality and production. Further research exploring the long-term impacts of this technology on beehive health and honey quality is warranted.

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