

## Design And Build A Simple Durian Fruit Harvesting Tool (*Durio zibethinus* Murr)

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### ABSTRACT

*Fruit picking tool is one of the equipment used to facilitate the harvesting process, in fruit picking it is necessary to choose fruit that is feasible or ready to be harvested, for example ripe durian fruit. In this study, we will conduct research on the design of a simple durian harvesting tool that is not widely known by the wider community which has the potential to be one of the tools that is needed in Jombang, precisely in Sumber Village, Wonosalam District, Jombang Regency. A simple durian harvester has a circular area of 60 cm, a width of 30 cm, and a height of 40 cm, all of which are made of 5 ml iron and a steel knife. This tool is operated by one person and has several components, namely consisting of songong/songkrok, knife or borer, connecting frame, and pole, each of which has a specific function. This research was conducted to facilitate durian farmers in picking durian fruit and reduce the occurrence of fruit damage at harvest and practical use.*

**Keywords:** *Durian Fruit; Durian Plant; Harvesting Tool.*

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### INTRODUCTION

Indonesia is an agrarian country where most of the population is engaged in agriculture. This is because the natural conditions of our country are very fertile, with a very wide expanse of land, as well as abundant biodiversity and the location of the country with a tropical climate where sunlight occurs throughout the year. Indonesia has many types of fruits (Firda & Christian, 2020); (Mustaqimah, 2012). One of them is durian fruit. Durian is a plant that has a characteristic with sharp spines and many surrounding the skin and hard texture. Durian is also a plant as well as food that is very popular with the people of Indonesia. With its thorny shape and hard skin, harvesting durian fruit is difficult to do manually using traditional methods.

Fruit picking tool is one of the equipment used to facilitate the harvesting process, in fruit picking it is necessary to select and sort fruit that is feasible or ready to be harvested, one example is like ripe fruit or fruit that is old by using this method. selective harvest (Nasirudin & Yuliana, 2020). Picking can be done directly by hand or using ladders and poles equipped with a fruit holder (songsong/songkrok) at the end (Jemris, 2018 et al, 2018).

In general, Indonesian people harvest durian fruit in the traditional way, namely by climbing a tree and wrapping it with raffia rope (Almadora et al, 2014). However, this traditional method takes a lot of time, energy, and has a big risk. For small entrepreneurs, the risk and inefficient time are not too felt, but for big entrepreneurs, risk and time are not efficient to be a big obstacle for them in harvesting durian fruit with this traditional method (Iqradiella, 2019).

With the problems that exist in durian farmers, namely when harvesting durian fruit there are still many manually by climbing the durian tree and tying the durian with raffia rope or waiting for the durian fruit to fall from the tree. Harvesting in this way will take a long time, damage the fruit, and pose a risk of work accidents (Yuliana et al, 2021). To overcome the limitations or weaknesses of harvesting fruit using the manual/traditional method, a fruit picker is made that is able to pick fruit and reduce the occurrence of fruit damage at harvest and is practical to use (Nasirudin & Qomariyah, 2021). This tool is a fruit picking tool that helps in harvesting fruit crops, especially durian fruit.

In this study, we will conduct research on the design of a simple durian harvesting tool. This fruit

picking tool is a simple tool called a hook pole and a wire net. The way to use this tool is to hook the hook knife on the twig you want to pick, then the pole is pulled or rotated until the fruit is picked and enters the net (Ultra, 2015). This durian fruit harvester has not been widely known by the wider community which has the potential to be one of the tools that is very much needed in Jombang, precisely in Sumber Village, Wonosalam District, Jombang Regency.

## **METHOD**

There are 2 locations in this study 1 data collection in the form of observations and interviews, namely in Sumber Village, Wonosalam District, Jombang Regency, 2 Work on making simple durian fruit harvesting tools in Bandung Village, Diwek District, Jombang Regency. Data collection was carried out in the village due to recommendations from the Advisory Lecturer, while the work was carried out in the village because the researcher lived in Bandung Village, Diwek District, Jombang Regency. This research started in February – April 2021. The materials used are durian as a fruit to be picked, iron wire, steel knife, 5 ml iron, bamboo pole, spet, rubber rope. The tools used in this study were welding equipment, drilling machines, grinding machines, press tools, hammers, pliers, tape measure, scissors, hacksaws, stationery, computers, and cameras.

The implementation of the research begins with determining the location with the farmers. Then the sampling was carried out and interviewed the farmers. The parameters observed were the size of the durian fruit and the height of the durian tree. In identifying this problem, it is necessary to pay attention to the problems that arise in farmers and are adapted to the conditions of farmers or users. The problem that exists for farmers today is that when harvesting durian fruit, there are still many manually by climbing trees and tying the durian tree with rafiya ropes or waiting for the durian fruit to detach from the tree or fall. Harvesting in this way will take a long time, damage the fruit, and pose a risk of work accidents.

The idea for the design of this tool arose after seeing various kinds of harvesting tools in the form of poles or sungkruh on the internet, such as poles that function to reach fruit from tall trees and sungkruh to pick up fruit so that it can reach the bottom in a condition that is not damaged or damaged. Therefore, the authors adapt the harvester system using a pole and sungkruh and apply it to the design of a durian fruit harvester using a knife at the end of the sungkruh to facilitate the separation of fruit from the tree.

The working principle of this durian fruit harvester is as follows, the main framework of songong/songkrok as a component of the durian fruit harvester, the durian fruit is inserted into the songong/songkrok and aligns the knife on the end of the durian fruit or Rafiyya which is tied to the durian fruit that has been separated from the tree. and pull the pole to hoist the durian fruit to release it from the tree, then lower the durian fruit slowly. Functional design analysis was carried out to design the function and location of the components needed for the durian fruit harvester.

- Songsong / songkrok, serves as a container to accommodate the durian fruit when it is harvested.
- Knife or borer, serves to separate the fruit from the tree.
- The connecting frame, serves to connect the pole to the songong/songkrok.
- Galah, serves to make it easier to reach the fruit from the tree.

## **RESULT AND DISCUSSION**

### **Specification Design And Design Of Durian Harvest Equipment**

A simple durian harvester has a circular area of 60 cm, a width of 30 cm, and a height of 40 cm, all of which are made of 5 ml iron and a steel knife. This tool is operated by one person and has several components, namely consisting of songong/songkrok, knife or borer, connecting frame, and pole, each of which has a specific function. The design drawing of a simple durian harvesting tool frame can be seen in Figure 1.

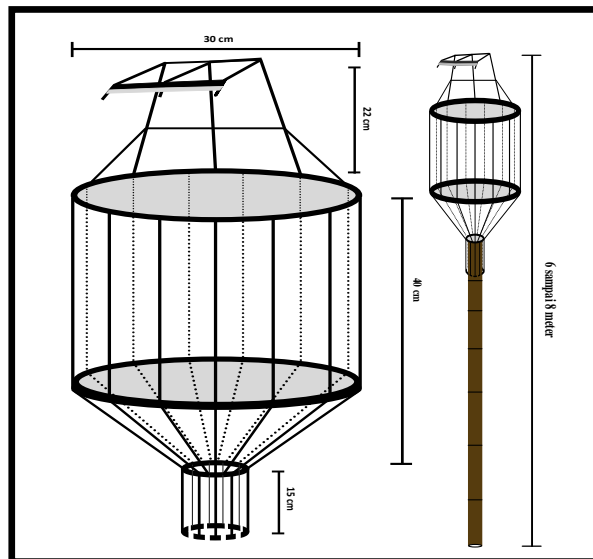


Figure 1. Design of a simple durian harvesting tool frame.

### Result

- Songsong or Songkrok

Songsong or songkrok is one of the traditional tools known for fruit harvesting tools, songsong or songkrok which in Indonesian is called the frame of the fruit harvester. The frame is made of 5 ml iron, the frame area is 60 cm, the width is 30 cm, and the height is 40 cm, on the songsong/songkrok frame there is a place for placing durian fruit or the position of the fruit which is made in a circle. The use of 5 ml iron on the songkrok or songkrok framework aims to make the tool frame more sturdy when holding the weight of the durian fruit. The songkrok or songkrok frame can be seen in Figure 2. Here is one of the series of songkrok or songkrok:

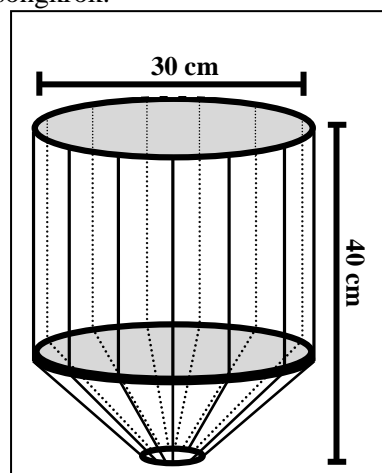


Figure 2. Songkrok or songkrok framework design.

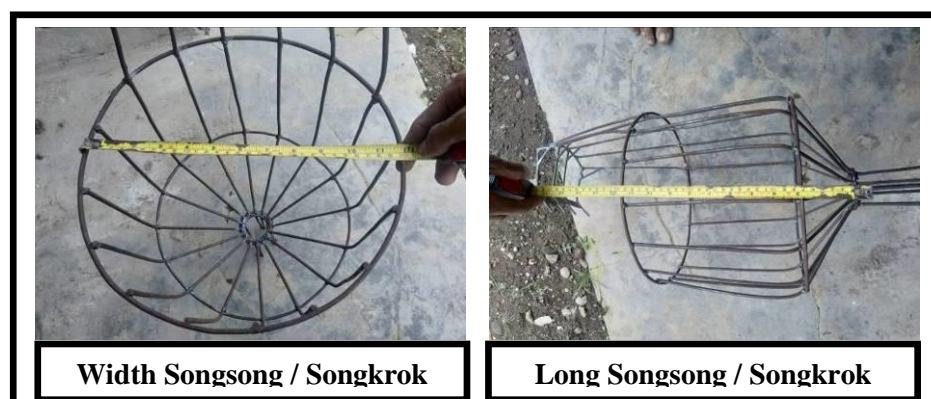
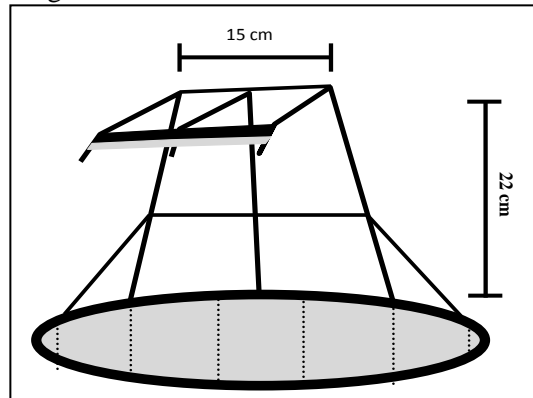


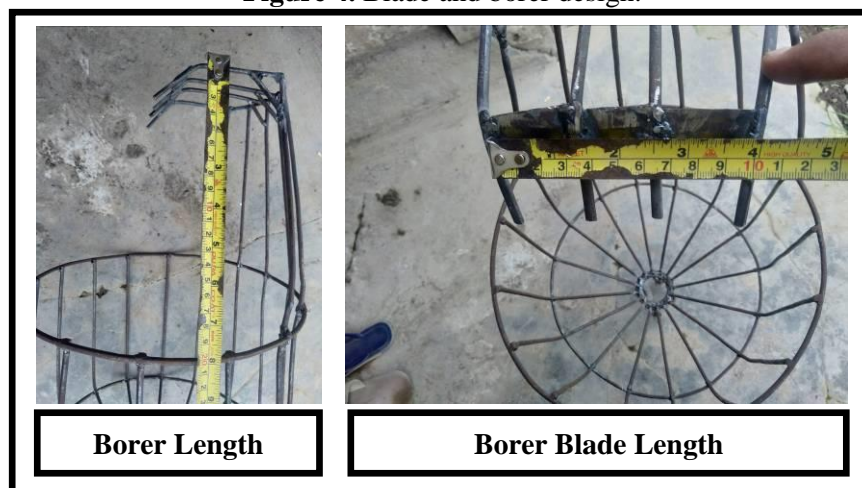
Figure 3. Songsong or Songkrok.

- Knife and Borer

The knife is made of saw blade steel with the characteristics of a length of 15 cm, a width of 2 cm, a thickness of 1.5 ml and a borer made of 5 ml iron, a length of 10 cm, a width of 15 cm, a height of 22 cm, there are 3 iron borers with between 5cm which is used to clamp the stem and insert it into the knife. The use of steel saws aims to make the knife sharper and easier to drill durian fruit stems. The knife and borer can be seen in Figure 4.



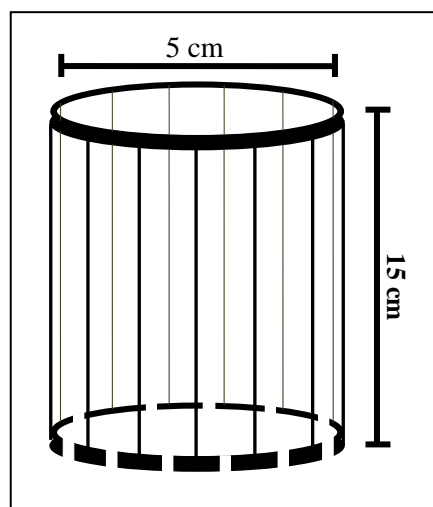
**Figure 4.** Blade and borer design.



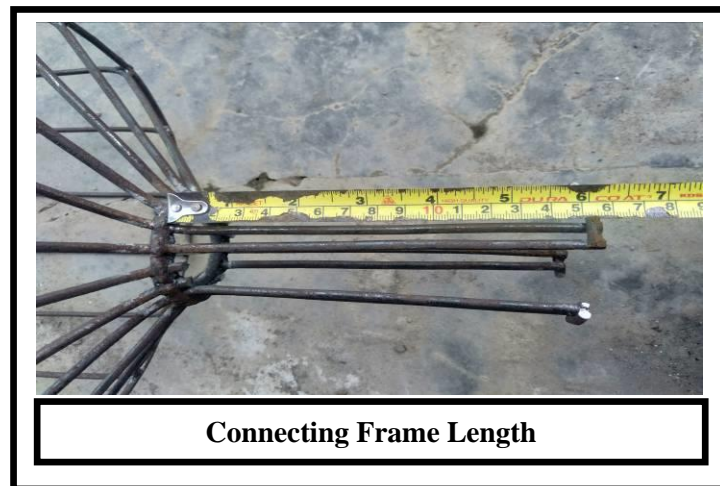
**Figure 5.** Knife and borer design.

- Connecting frame

The connecting frame is made of iron which has a size of 5 ml, a width of 5 cm, and a length of 15 cm. In order to connect it can be used to connect the pole to songong or songkrok. The connecting frame can be seen in Figure 6.



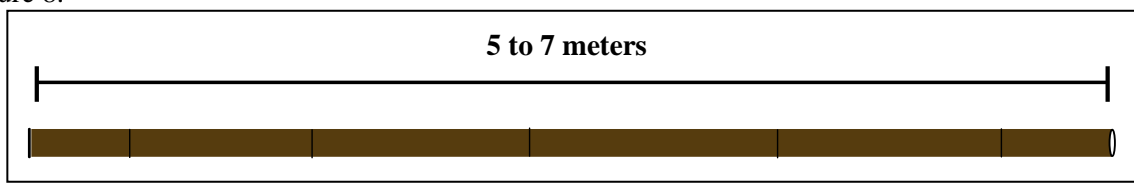
**Figure 6.** Connecting frame design.



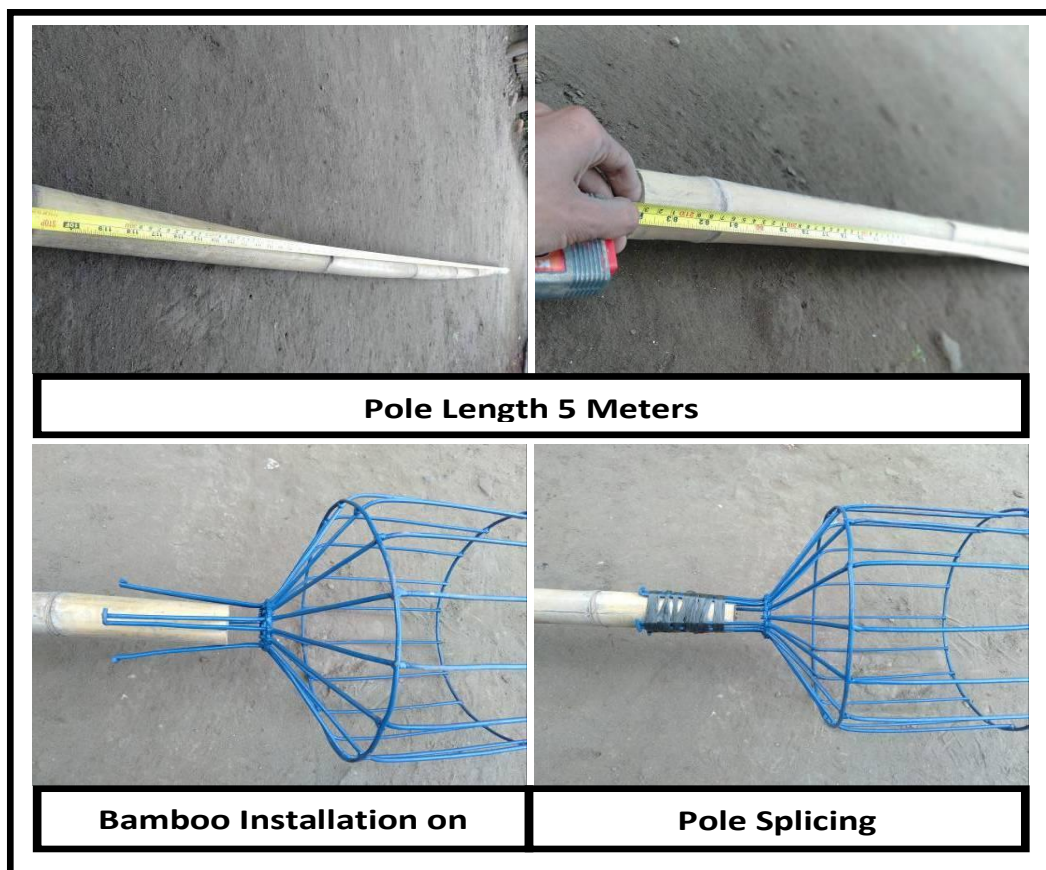
**Figure 7.** Connecting frame.

- Pole

The pole is made of bamboo with a length of 5 to 7 meters. Bamboo is an additional tool that is used to make it easier to reach durian fruit from the tree and the use of bamboo aims to make it easier and more practical because the pole made of bamboo has a light load characteristic so it can make it easier to reach when harvesting the fruit. The following is the Galah design which can be seen in Figure 8.



**Figure 8.** Pole.



**Figure 9.** Pole with songsong/songkrok.

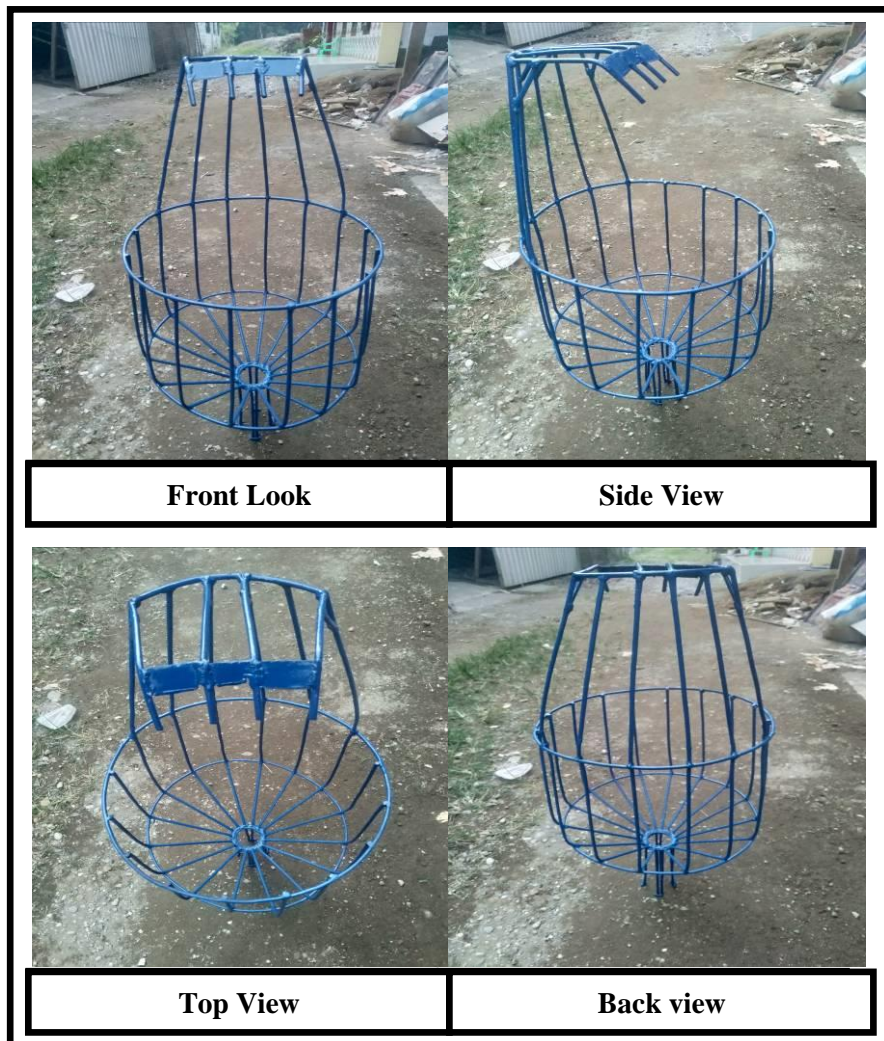
**Discussion**

- Tool Specifications

The final result of this research is the parameter of making and testing the tool which can be seen in Table 1.

**Table 1.** Design Specifications for Simple Harvesting Tools for Durian Fruit.

<b>Parameter</b>	<b>Keterangan</b>
Dimensions (W x W x H)	50 cm x 30 cm x 30 cm
Number of Operators	1 Person
Frame Construction	Steel 5 ml
Knife Type	Steel 2 cm
Commodity Type	Durian Fruit
Tool Weight	2 Kg



**Figure 10.** A Simple Durian Harvesting Tool.

- Testing Tools
  - Experiment

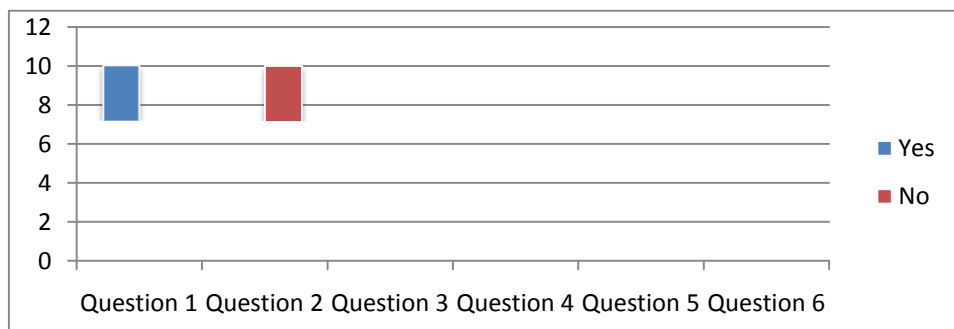
At the time of testing the initial stage of the tool used was to conduct a trial or experiment directly, so as to be able to find out how strong and efficient the tool was at the time of harvesting. An experimental picture of a simple durian harvesting tool can be seen in Figure 11.



**Figure 11.** Testing of Durian Fruit Harvesting Equipment.

• Interview

At the time of testing the tool, interviews with farmers were carried out, so as to minimize existing deficiencies.



**Figure 12.** Graph of durian farmer respondents' results.

- Question 1 : Have you ever used a durian harvester before?
- Question 2 : Do you find it difficult to use a durian fruit harvester?
- Question 3 : Is this simple harvester too heavy to use?
- Question 4 : In your opinion, is this simple harvester suitable for durian farmers' needs?
- Question 5 : Do you think that this simple harvester can help make harvesting durian fruit easier?
- Question 6 : In your opinion, how is the condition of the fruit after it is harvested using this simple durian fruit harvester?

- Correspondent Result

The results of correspondents or interviews from the surrounding community, especially farmers who are in the source hamlet, Wonosalam sub-district, get about 60% of the people who agree and study durian fruit harvesting equipment, while 40% of the people who still do not understand or do not agree about durian fruit harvesting equipment because of the burden heavy equipment, this is because some people still want to use the traditional way by climbing trees.

## CONCLUSION

Based on the research that has been done, it can be concluded that:

- A simple durian fruit harvester is proven to be quite effective in harvesting durian fruit. This is evident from the durian fruit harvester equipped with a cutting knife. So that this tool can facilitate farmers in the process of harvesting durian fruit.
- Looking at the results of questionnaires or interviews conducted by researchers, it shows that this tool is proven to be effective in the process of harvesting durian fruit.
- This tool is more efficient because this tool is easier to operate, besides that farmers also no longer need to use the traditional method, namely by climbing trees. But this tool has a weakness, namely from the weight of the tool load felt by farmers during the durian fruit harvesting process.

## REFERENCES

- Almadora, A. S., Mardiana., & Dicky, S. (2014). Desain Inovasi Alat Bantu Pembuka Kulit Durian Untuk Industri Kecil. *Jurnal AUSTENIT*, 6(1), 1-4.
- Firda, A. A., & Christian, S. (2020). Rancang Bangun Alat Pengupas Durian Tipe Press. *Mekanika*, 1(2), 1-4.
- Iqradiella, E. A., Kristian, S. W., Thoriq, A., & Yusuf, A. (2019). Desain Alat Pemanen Buah Manggis Melalui Pendekatan Kansei Engineering. *Jurnal Hasil Penelitian dan Industri Terapan*, 8(2), 75-81.
- Jemris, S., Siradjuddin, H., & Burhan, L. (2018). Redesain Alat Pembelah Buah Durian Menggunakan Prinsip Sistem Mekanik Vertical Press dan Portable. *Jurnal Teknologi Pertanian Gorontalo (JTPG)*, 3(1), 1-8. <https://doi.org/10.30869/jtpg.v3i1.165>
- Mustaqimah, M. (2012). Perancangan dan Pengujian Alat Pemetik Pepaya Tipe Semi Mekanis. *Jurnal Teknologi dan Industri Pertanian Indonesia*, 4(3), 9-13.
- Nasirudin, M., & Qomariyah, S. N. (2021). Analisis Kelayakan Usahatani Padi Organik di Desa Bareng Kecamatan Bareng Kabupaten Jombang. *Exact Papers in Compilation (EPiC)*, 3(2), 325-332.
- Nasirudin, M., & Yuliana, A. I. (2020). Indeks Nilai Penting Serangga pada Perkebunan Apel Semiorganik dan Anorganik Desa Wonosari Pasuruan. *Exact Papers in Compilation (EPiC)*, 2(03), 287-292.
- Ultra, M. (2015). Rancang Bangun Alat Pembelah Buah Pala (*Myristica sp.*) Semi Mekanis. [Thesis]. [http://scholar.unand.ac.id/1270/1/201511260212th\\_skripsi%20ultra%20maswira.pdf](http://scholar.unand.ac.id/1270/1/201511260212th_skripsi%20ultra%20maswira.pdf)
- Yuliana, A. I., Ami, M. S., & Hariono, T. (2021). Development of environmentally friendly urban agricultural system through household waste utilization training in Jombang Indonesia. *Jurnal Pemberdayaan: Publikasi Hasil Pengabdian Kepada Masyarakat*, 5(1).