

## Future Red Pepper Picker

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**Abstract:** This study was conducted to produce a pepper/chilli picker to shorten the harvest time by using the appropriate components. Studies on problems often faced by farmers or suppliers indicate a solution framework needs to be developed. The development of this project is important to make it easier for farmers or suppliers to harvest crops quickly by meeting the period of pepper/chilli days, which are very suitable for harvesting as well as getting good freshness to be sent to wholesalers. To make it easier, we designed a tool to form a pepper/chilli picker without having to use a machine to do the harvesting process. Overall, this project will facilitate and replace the daily routine work of farmers or suppliers who do the work of picking very much pepper/chilli on the tree.

**Keywords:** Chilli, Harvest, Pepper, Picker, Tool

### 1. Introduction

Harvesting mature peppers will be tough and time-consuming for farmers who operate large pepper farms. Harvesting red chili necessitates a large number of laborers working in the fields, and pepper picking takes a long time. Choosing an efficient pepper picker will be a fantastic decision for lowering harvesting time and saving a lot of labor expenditures. This red chili picking equipment may effectively replace labor-intensive pepper harvesting.

### 2. Literature Review

Prior to the development of this red pepper/chilli picker, farmers and the supply of pepper/chilli encountered several challenges in choosing pepper/chilli that was ripe or mature enough. For example, when the pepper and chili seasons overlap, farmers or suppliers are pressed for time to collect them all. This tool will help with the harvesting procedure[1].

The main goal of designing this red pepper picker is to make pepper/chilli picking easier in the vertical axis and to hope that all problems encountered by farmers or suppliers can be resolved. The actions taken to make sure that the project operates smoothly. As a result, it is critical to be able to test and analyze this system in real-world scenarios involving farmers or suppliers[2].

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Furthermore, for the task, if they want to pick pepper/chilli immediately, which may require high potential tools to pick quickly, it will make the farmers or suppliers do the work immediately. This gives them a lot of convenience, such as not wasting time trying to figure out a fairly large number with special tools [3]. Hence, the taburation of each pepper/chili not even.

The waste of time and worker safety during the harvest period (it was gathered by hand during routine harvesting) while in the field require more attention because they have a significant impact on productivity, operating costs, and overall waste of time [4]. The long-term impact on productivity, time, and cost is significant.

The objective of our study is to make this tool usable in the future and be able to reduce employee wage costs. For the study, this tool does not incur excessive cost and is easy to replace components in case of minor damage. In addition, it is also simple to apply anyplace, such as in a cluster of bunch pepper/chilli that is unevenly. This tool is lightweight and safe to use on the farm.

### 3. Materials and Methods

**Table 1: Materials list**

No	Materials	Quantities	Uses
1	Hollow ( $\frac{1}{2} \times \frac{1}{2}$ ) inche	1(650mm)	Frame
2	Plate (150 x 70 x 2)mm	2	Stalk separator
3	Nut	3	Binder
4	Screw	5	Shaft
5	Spring	2	To make the plate always closed
6	Plate defend	2	To make the device in the correct position

**Table 2: Machine Tools Used**

No	Equipments	Usages
1	Grander	Cutting materials
2	MIG machine	Welded the materials
3	Manual iron bender	Bent iron

In designing a tool, one must use certain materials (in this project as **Table 1**) that suit what is to be created. In addition, the use of machines in the process of preparing an invention (as listed in **Table 2**) must be very important in producing a very perfect tool with functions that can be implemented well.

Metal is bent by machine tools for usage in a shop or on a building site. Some metals can be bent without the use of machine equipment. However, employing them enhances productivity, generates accurate, high-quality goods, and reduces injury rates. When utilizing machine tools, take the same precautions as you would with any major piece of machinery. Besides that, a disc grinder is used as a portable power instrument that can be used for grinding (abrasive cutting) and polishing. The bracket for the bearings is then welded together. Both preprocessing, cutting, and then welding are also common practices in engineering workshops.

#### 3.1 Result

This red pepper picker is made up of 90% iron that has undergone certain processes and is carefully fabricated to avoid any defects in our products. The first method used to ensure the success of our product is a literature review, but unfortunately, the product we want to review has very little reference. So, by doing group member discussions, various ideas were poured in, and finally we agreed to produce an excellent product. Upon completion, we began to search for the necessary materials and proceeded to perform the work of cutting the iron, connecting the irons so that the shapes were visible, and so on. Not to forget, this product has been tried and the results work very well. The last process is the process of painting the product so that it rusts.

### 3.2 Equation

In this study, the formula (**Eq. 1**) taken into account is the spring formula, which in our design involves springs. The main function of the spring is to keep the pepper picker closed.

$$F = kx \quad \text{Eq. 1}$$

Where

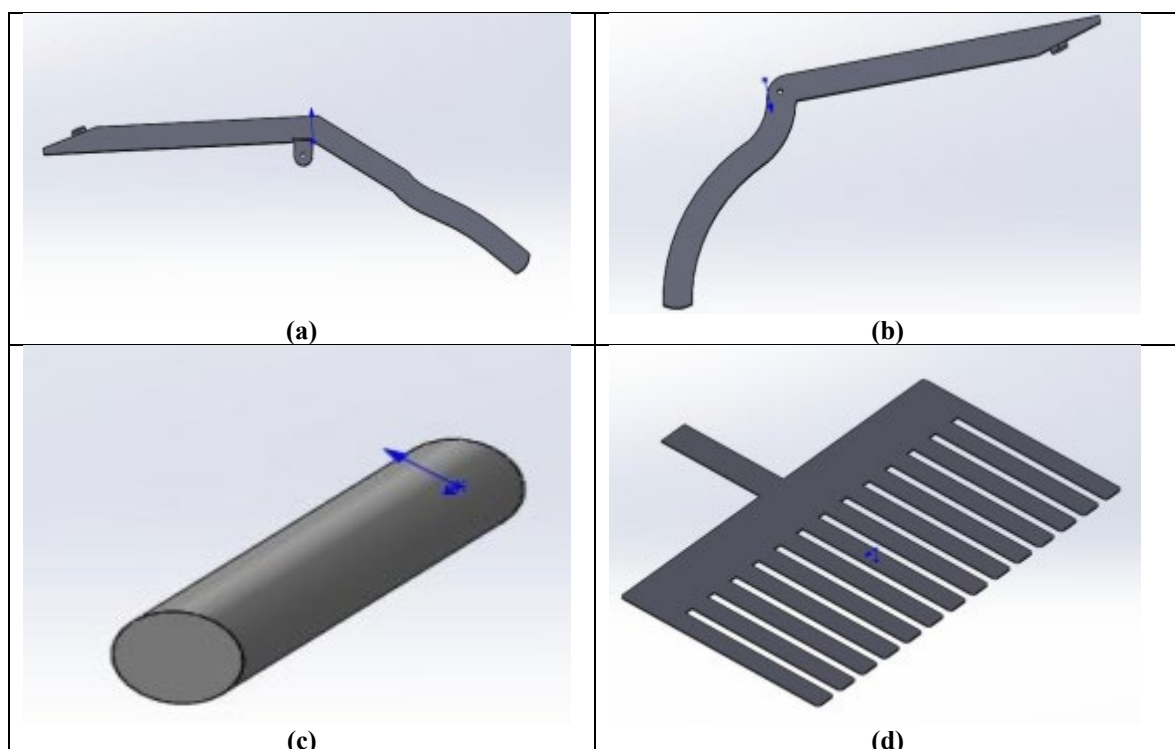
$F$  : Force (N)

$k$  : Spring constant (N/m)

$x$  : comb opening length (m)

### 4. Results and Discussions

For the results and discussion section, we will look at several terms. It is evaluated in terms of the operational efficiency of tools, such as meeting quality objectives. It is also evaluated in terms of the operational efficiency of the selector tool as well as the quality of the results. These findings are also compared with other approaches by taking into account many parameters. The result of chili picking is one of the operating efficiencies highlighted. It must be chosen correctly and applied in the SolidWork diagram as **Figure 1(a) to Figure 1 (e)**. The target distance between the teeth is sufficient at 0.5 cm, as shown in **Figure 2**. With the gap between these teeth, the chili can be picked in good condition and not be injured. Lastly, one of the things that is emphasized is how users can use this device according to the required suitability. A comprehensive 3D design is created using SolidWorks software prior to the production process. That's figures show a comprehensive 3D representation of the design structures.



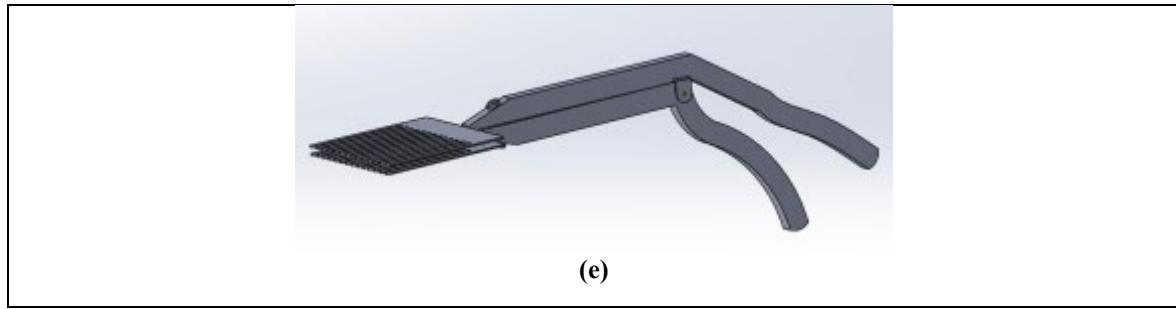


Figure 1: 3D representation of the design structures (a) Inner blade, (b) Outer blade, (c) Joint Nut, (d) Comb, (e) Full Assembly

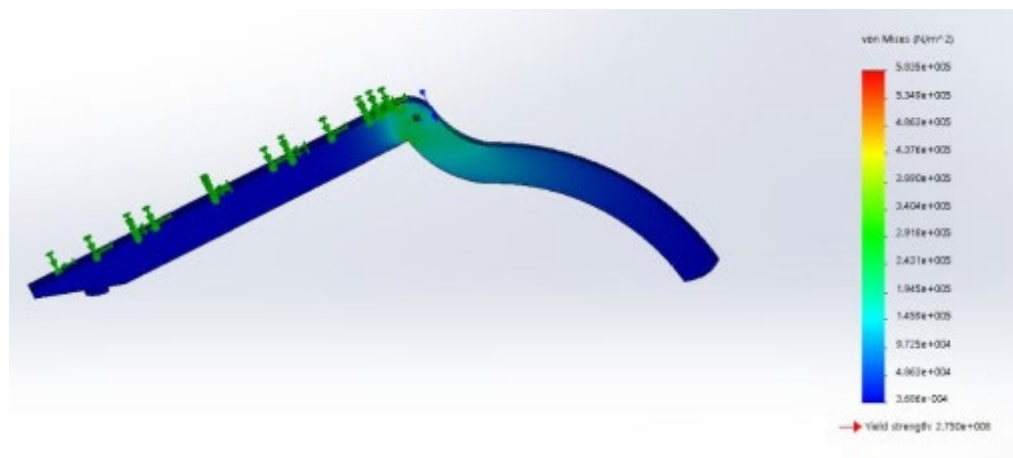


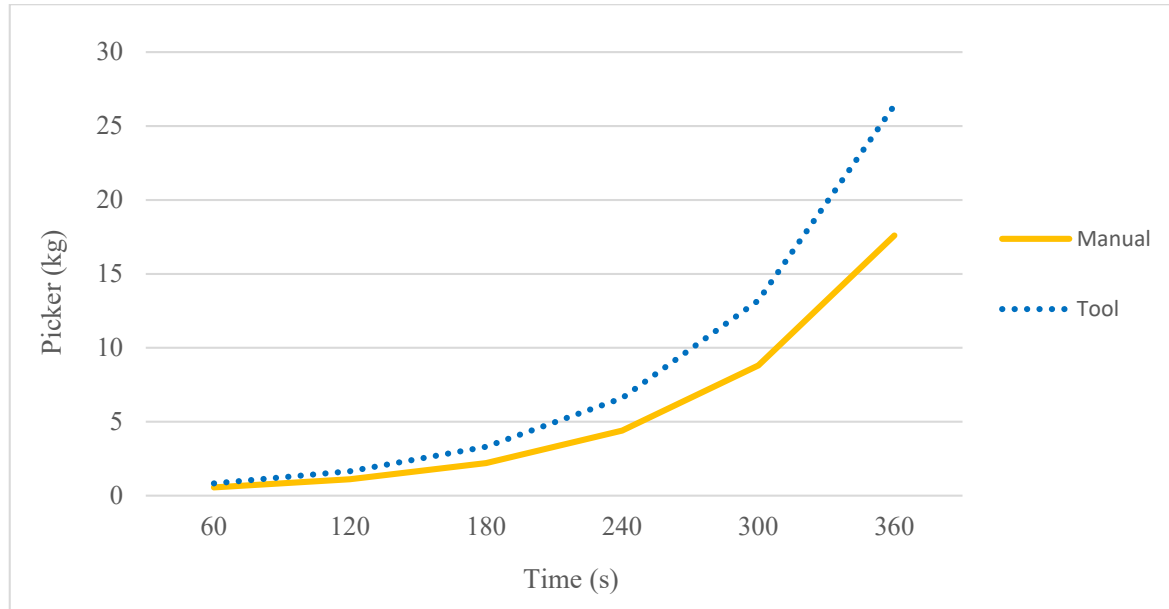
Figure 2: Finite Element Analysis

We analyzed the outcomes of the inquiry and study by looking at how this tool helps users, particularly gardeners, choose matured chilies. We conducted experiments to collect data while plucking chilies from chili trees [5]. Our group has concentrated on several parts of testing or evaluating the data that we will collect in order to demonstrate the differences between different techniques of choosing chilies [6, 7, 8]. The total weight (kg) and time required to collect the chilies in the chili plant will be discussed. As a result of the collected data, we will present the differences in graphs and tables. Aside from that, force and comfort are considered while assessing chilli-picking instruments (**Figure 3**).



Figure 3: Chili picker tool prototype

We observed that the new design tool might be used to pick chili crops more quickly. The consequence of a fresh and undamaged chilli extract: other than being able to choose the chilli in it easily, this tool has demonstrated that it does not harm the quality of the chilli. Aside from not affecting the quality of the chilli, this instrument can yield 1.5 times the amount of chilli collected as hand-picking as plotted in **Figure 4**. This is due to the tool's ability to pick more than two chillies at the same time. This can demonstrate that this instrument can help enhance total production of chilli extract while also reducing labor for farmers out there.



**Figure 4: The number of chillies picked(kg) versus method**

**Table 3: The number of chillies picked (kg) between manual and tool**

Item No.	Parameter Name	Variable Value (Kg)	Time (min)
1	Hand	0.550	1
2	Red Pepper Picker	0.825	1

**Table 4: Cost estimation**

Item No.	Component	Quantities	Cost per unit (RM)
1	Hollow (½ x ½)inche	1(620mm)	36.00
2	Plate (150 x 70 x2)mm	2	10.00
3	Nut	3	1.00
4	Spring	2	2.00
5	Screw	5	1.50
6	Plat defend	2	1.00
Total			72.50

**Table 3** shows the link between the method of choosing chillies and the number of chillies picked in one minute. This was recorded in order to determine how useful this tool was in assisting the chili-picking session. Meanwhile, cost estimation is listed as part of project in **Table 4**.

### 5. Conclusion

The inference that may be made is that the picker performed admirably during the investigation. According to the study, this instrument can harvest 1.5 more chillies per minute compared to those manually collected by hand. Harvesters can be made more efficient by equipment that makes full use of mechanical mechanisms. The harvesting of the chillies, which have even smaller stems, can be made

even better by adjusting the comb size. For instance, the bird pepper and the F1 hybrid chili pepper have different sizes and shapes. In addition, the improvement that can be made to this tool is to place a container to add more space that can accommodate the weight of more pepper for the occasional harvesting process.

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