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TAPIOCA PULLER

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Abstract:

Tapioca (cassava) is a shrub grown in the tropics and subtropics for its underground starchy tuberous roots. Nowadays technology has been playing a major part in developing agriculture not only making it simple but also increasing high productivity, but till now the pulling of the cassava's root is done manually. The manual pulling is not only time consuming but it needs more labour also, as this process may cause injuries to the labour the availability of the labour was a huge problem. Considering this problem we have designed and fabricated a machine with the help of simple first order lever mechanism to pull the cassava roots with less labour and consuming less human effort at low cost .

1. Introduction:

Tapioca is the shrub plant grown by the farmers of tropical and subtropical regions in the large scale for their starchy roots .Since it belongs to the fibrous root family it requires large amount of power to lift it off from the ground .The farmers used manual pulling process for pulling the roots .In the manual pulling process all works has to be made by the human it may has some of the serious troubles

- This process requires more number of labour.
- This process causes injuries to the labour.
- There is a consistent increase in labour demand.
- It is also a time consuming process.

There are numerous number of agricultural machines were developed to help the farmers .So in order to help the farmers in the tapioca cultivation we have developed a product with the help of simple first order lever mechanism .

2. First Order Lever Mechanism:

A simple first order lever mechanism consists of a lever and a fulcrum. The lever is the moving part which is pivoted on the fulcrum on a single point .By applying forces and different distance from the fulcrum the output on the other bar will be varied. The simple first order lever mechanism is shown in the figure refer fig.1

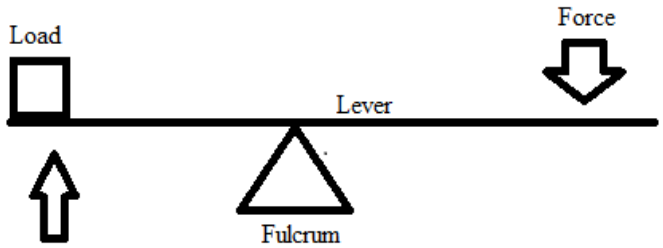

Figure 1

The fulcrum is the fixed part and the lever is pivoted on the fulcrum by the single point .When the force is applied eccentrically on the lever from the center of rotation the output obtained will be greater than the input given .The ratio of the output force to the input force is the mechanical advantage of the lever.

$$mechanical\ advantage = \frac{output\ force}{input\ force}$$

Let us consider that the distance between the fulcrum and the point of applying the force as A and the distance between the fulcrum and the load to be lifted as B. It is found the product of the distance A and the applied force is proportional to the product of the output force obtained and the distance B.

$$applied\ force\ \boldsymbol{X}\ A = load\ \boldsymbol{X}\ B$$

3. Practical Model:

3.1 Fulcrum: In a practical model the main base frame acts as a fulcrum. It acts as a base for the model and it is provided with the rotating wheel for moving easily in the field.

3.2 Lever: The long MS-rod pipe will be the lever and the long end side will be used to apply the force. At the shorter end of the lever the tool is fixed.

3.3 Tool: The tool will be the MS-plate with the V cutting in the center in order to grip the lower stem of the tapioca plant.

All the above mentioned parts can be found on the modeling drawing modeled using the 3D modeling software refer figure 2.

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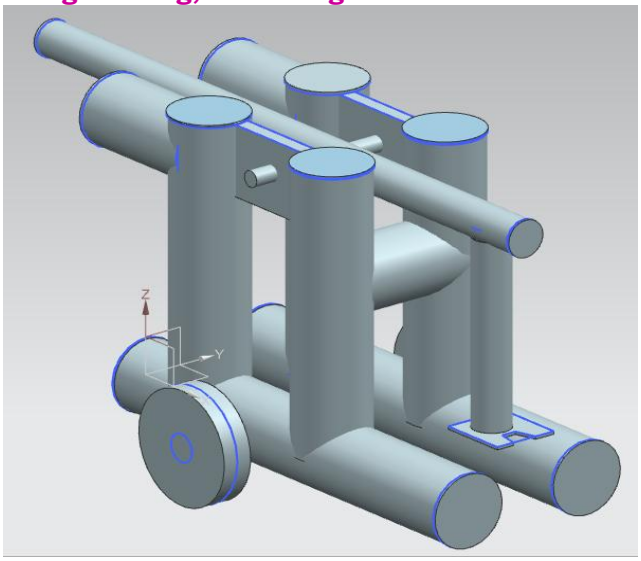

Figure 2

4. Working:

The tapioca puller will be working on the simplest mechanisms .so, there won't be much difficulties. It consists of following steps. The first step was to grip the lower stem of the tapioca plat in the tool which is simple and the next step was to apply the downward force on the other side of the lever. Which provides the required force to pull the roots up.

5. Calculation

The basic calculation example for the force calculation of this mechanism will be given as follows. The force applied on the larger end as 10N.

A = 0.7 m
&
B = 0.3 m
E x A = R x B
10 x 0.7 = R x 0.3
R = (10 x 0.7) / 0.3
R = 23N

Which will be sufficient enough to pull off the tapioca roots off the ground.

6. Comparison between Manual Pulling and Tapioca Puller:

6.1 Manual Puling:

- This process requires more number of labour.
- This process causes injuries to the labour.
- There is a consistent increase in labour demand.
- It is also a time consuming process.
- The productivity of this process will be low.

6.2 Tapioca Puller:

- This process reduces the requirement of number of labour.
- This process increases the productivity.
- It is a safe process for the labor prohibiting the chances for getting injured.
- The money spent on labour will be decreased.
- Doesn't need much physical strength.

7. Conclusion

My hypothesis was that our project tapioca puller will be one of the better device which could help the farmers. By using this device farmer can be able to have less number of labour thereby he can gain some money invested in labour. Thus the cost of the vegetables in the market may also be get reduced .this also helps in decreasing the production time and also the less wasting of human effort. Therefore it is stated that using these kinds of devices will greatly promote the agricultural practices.

8. References:

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