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A REVIEW ON MODELLING OF LOW- COST LEAFY VEGETABLES CUTTING MACHINE BY IMPROVING PERFORMANCE OF CONVEYOR

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Abstract

This review paper reveals the best design of harvester for farming a leafy vegetable. In a farming of lettuce, spinach, and baby leaf type leafy vegetables harvesting is by manually is bottle-neck work. And there will be the loss of time and money in harvesting the vegetables, as well as more cost is spent on the workers. And more amount of wastage of vegetable occurs in manual farming process.so for lowering the wastage as well as time and money harvester is modelled for vegetable production. harvester consist of the cutting blade which cut the vegetable head at perfect location. And then this cut vegetable is lifted in container by using conveyor. A cutting equipment band saw belt is used and transport belt is driven by the electric power .so we used the power unit for this harvester. For cutting and lifting purpose 12V DC motor will be used. Motion of this harvester manually. There is a facility to position the cutter height according to the, type of vegetable.

Keywords: Requirement Mechanism, Methods, Quality, Labor cost, working principle

1. INTRODUCTION

The harvesting of leafy vegetables is bottle neck work by manual harvesting. And most of the vegetable's quality get damaged, due to the improper harvesting of vegetables. and this can happen due to the lack of adroit workers. Quality lowers due to more time required for harvesting. Leafy vegetables have become a most popular and profitable vegetable due to the high demand for human. The quality and life of vegetables after harvesting affected by a pre-harvest factor like as a time requirement and method of harvesting. The time required to harvest the spinach, lettuce, etc. Is affected on the quality of the fresh vegetables (Yolanda Garrido, 2014) [1]

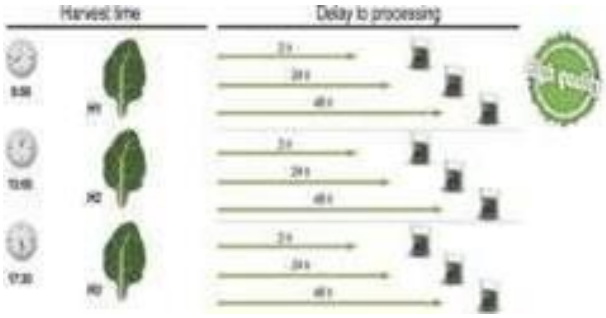

Figure 1.harvesting time and quality of spinach

Lettuce, vegetables are ready to use for kitchen and highly both in production of vegetables. New leaves using baby-leaf spinach at a mean stage and multi-leaf spinach at a pick stage have been developed. As need good quality lettuce and spinach for the fresh market. When this type of lettuce is harvested by manually the three will be chances to damage, which may result in degradation of color, texture and fragrance of fresh –cut vegetables or vanish the quality of vegetables (María C. Luna,2011) [2].In a city like India there will be the market which sales the leafy vegetables of ready to used fresh vegetables, have a rapid growth in recent years, in particular area requirement of the fresh cut lettuce and spinach is major demand because they used in pre pared salads (Marja Lehto, 2010) [4]. About 20,900ha of the lettuce are produced in one year in foreign country. In the winter season vegetable is grown in cover fields with four lines per bed cultural system, by using overall mulching and tunnel. The lettuce seeds have been transplanted in a different pattern and with more distance between them and inter line space which varies from the 27cm to 40cm. average in farming practices in vegetables production like as soil preparation, transplantation, and insect pasting has been mechanized. Vegetables are still harvested manually or hand-cut is stopped and lowers the cost invest on workers. Working hours for production of lettuce which is 650 h, or 30 percent of which includes the harvesting work. The need of this of harvesting depends on the availability of skilled workers So in advanced country there is the lack of human labor for farming operation. In this situation, the Harvesting of vegetables has been bottle-neck of cost reduction. These manual harvesting of vegetables harvesting intended to replace or the hand cutter-trimmer, with the machine. which increase the

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production of farming products and lowers the cost for it (Van Nguyen Nang, 2014) [5].

2. METHODS AND MATERIAL

Conventional harvesting of vegetables

vegetables starting at the September end and then continues till February starting. Harvesting of vegetables are normally from the November starting till the April. The harvesting of lettuce when temperatures is lowers, plants of lettuce are covered with plastic film to minimize the effect, of cold on the growth. However, this lettuce farming has been involved a much in the growth difference between the inner and outer rows of lettuce. Once the harvesting of leafy vegetables is done till the January (Fig. a) and then after that the selective harvesting is conducted by the cutting of first inner row (Fig. 2b and c). It has been taking many days for to do the second harvesting. Then the lettuces are selected and then cut using of a sharp cutter such like as a knife. Shipped spinach or lettuce is cutting at the middle leaf of lettuce, and trimming to leaves in three or four wrapper leaves, then these leaves are packed in the container. The heads of leaves are cut under the last leaf, cut to remain there will be the three to five wrapper leaves, then the cut lettuce has been packed in container and transferred to storage. The stored lettuce is then cut one more time up to maintain one wrapper spinach leaf, dies with the polymer sap and then covering of spinach with trademark facilities for before harvested or ready to used vegetables shipment. After the completion of harvesting of lettuce, the bed will be again used for transplantation of lettuce. (Van Nguyen Nang, 2014) [5]

Figure 2 conventional harvesting practices of head lettuce in shizuoka prefectur

3. CONCEPT OF HARVESTOR

originally the manually harvested lettuce, spinach is a mature and non-damaged Because the lettuce farming in winter in Japan in the plastic film tunnels, so mechanical harvesting of lettuce is technically unfeasible. Sometimes. Use of greenhouse culture has been studied intensely, at the Shizuoka Prefectural Research Institute of Agriculture for to improve the growth of vegetables (Van Nguyen Nang, 2014) [5]. There will be the use of motor for drive the cutter and conveyor so the, electric motors are well known as 'Prime movers' for Engineering Applications. DC motors are available at various speed, sizes & output power.

The basic rule, is converted from electric power into the rotational movement of rotor takes place in the rotating part of motor. (S. G. Kolgiri,2013) [15] Use of greenhouse culture has been studied, at the Shizuoka Prefectural Research Institute of Agriculture to enhance growth of vegetables (Van Nguyen Nang, 2014) [5]. There will be the use of motor to drive the cutter and conveyor so the, motors are well known as 'Basic Prime movers' for Engineering Applications. Electric motors are available at various speed, sizes & output power. The basic concept, is converted from electric power into the couple movement of rotor takes place in the moving part of motor. (S. G. Kolgiri,2013) [15].

Requirement from harvester

1. To mechanize entire farm which is to be harvesting
2. Injurer damage and spot the heads as lower
3. Less damage in cutting
4. For enhancing the working position of workers
5. For cheaper pack technique, lettuce heads will be shortening to remove excessive wrapper leaves, packed and dissipated the latex sap at the packing platform

4. WORKING PRINCIPLE

The harvester work as follows:

1. Forward motion the wheels are provided for movement manually
2. For cutting of vegetables with band saw blade cutter
3. Lifting of leaves on conveyor belt
4. Power source to drive the belt and cutter 12V DC motor are used and this motor are driven by battery unit
5. Collecting: cut vegetable transferred to the collecting box

5. MODELLING OF THE PARTS OF MACHINE

We used band saw blade for cutting the spinach. Which having material is stainless steel and brand is Multi cut, and their width is 1-2 inch.

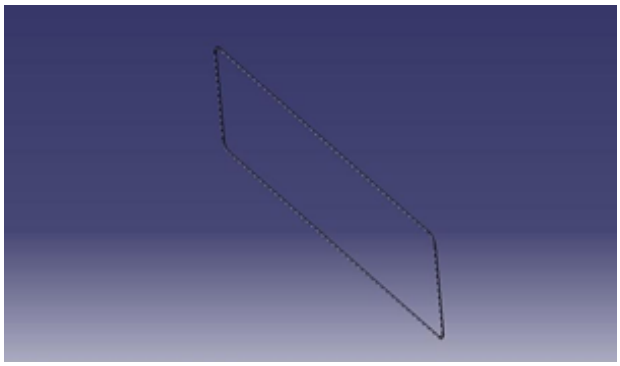

Figure 3 Band saw blade cutter

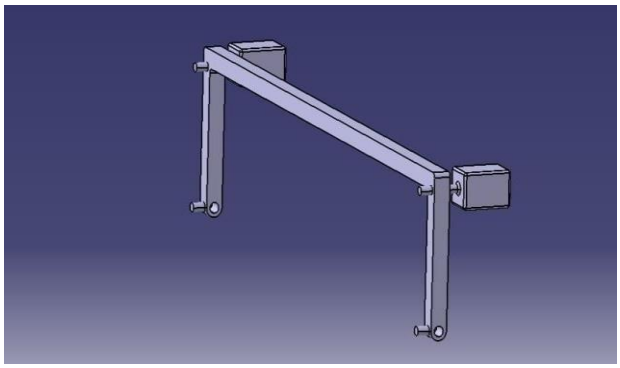

Figure 4 Cutter Drive unit

In Cutter drive unit for drive the cutter mechanism we used 24 V Dc motors for run the cutter. By using pulleys, we transmit the motor power or motion to cutter.

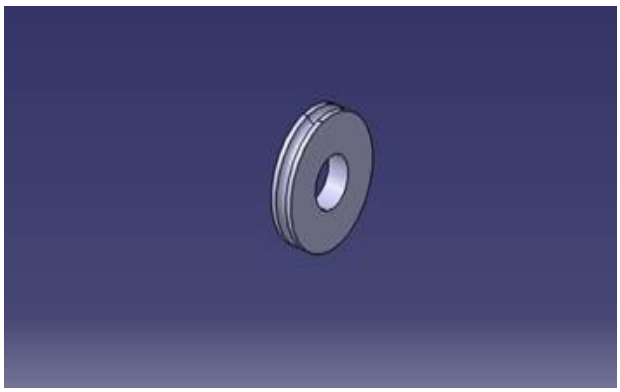

Figure 5 Cutter Drive pulleys

We used motor pulley to hold the cutter and transmit motion to the cutter of DC motor

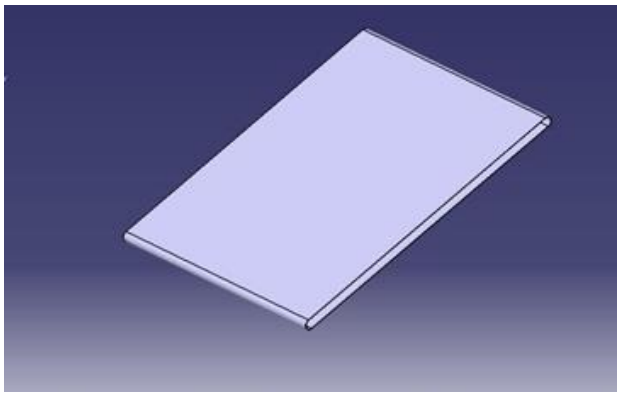

Figure 6 Conveyor belt

We use Rubber transmission Belt for conveyor purpose. Which having material is rubber and thickness is 15 mm. which having load capacity 50 kg

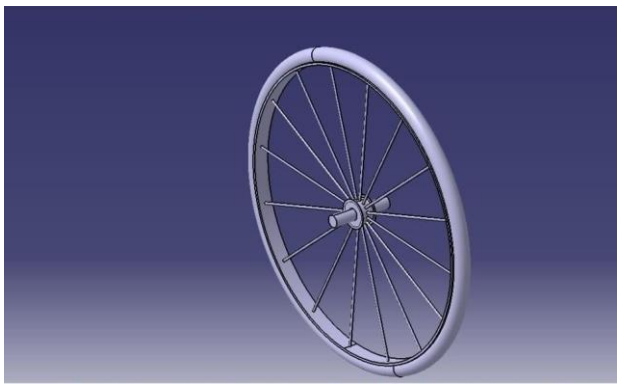

Figure 7 Rear wheel

For easy movement of harvester, we used bicycle wheels for this and according to this wheel's motion conveyor belt will be drive.

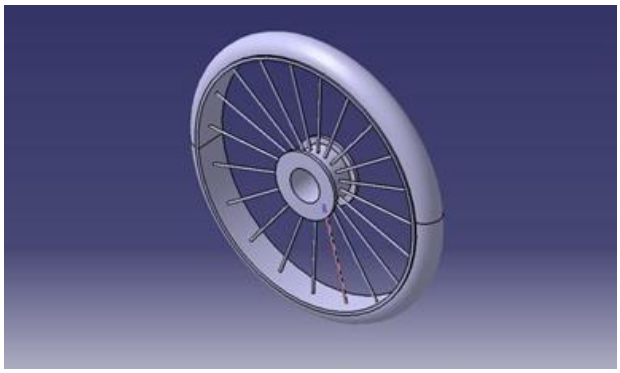

Figure 8 Front wheel

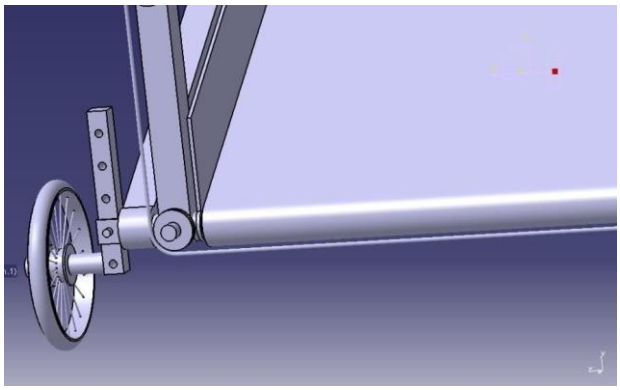

Figure 9 Height adjustment mechanism

By using this adjuster, we adjust the height of cutter height according to the vegetables.

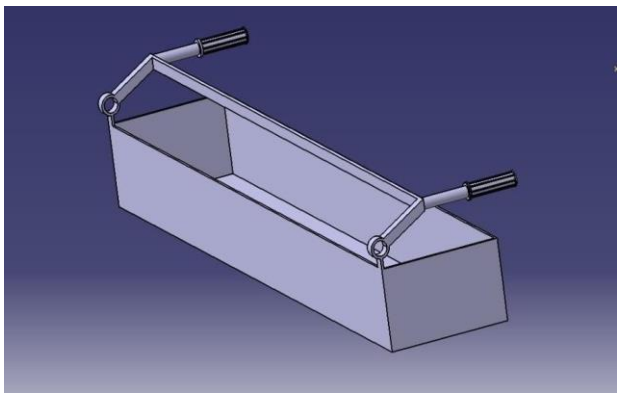

Figure 10 Storage container

We design the storage container for storage the cut vegetables and then stored in another storage. This storage container is made by using tin sheet. And this is attached to the end of the conveyor belt of upper end. And also, handle is provided is there for push the harvester.

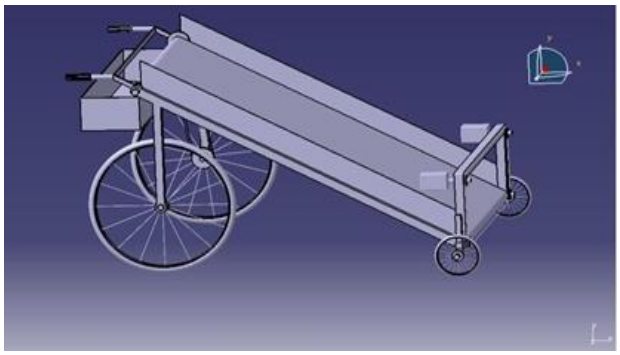

Figure 11 Assembly of harvester

6. CONCLUSION

By using this harvesting machine, we decrease time required for harvesting of vegetables as compare to the previous models of harvesters. As well as by manual harvesting there will be more money and time requirement are more, so we eliminate them. An acre of field contains nearly 4500 crops. Workers has required a payment of 6000 on daily basis the work on the fields. Using this machine, we can cut many acres of vegetables farm within less time. So, this harvester saves manpower, money and time. By using this harvesting machine, we can trim down the multiple Vegetables in few hours. This increases the speed of harvesting. This machine is a perfect choice for harvesting leafy vegetables Replacement of manual harvesting, which taking off more time and money.

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