

## A REVIEW ON DESIGN AND DEVELOPMENT OF VEGETABLES HARVESTER

Dr. Kolgiri S.G<sup>1</sup> Abhijeet Ranaware <sup>2</sup>Abhishek Raskar<sup>3</sup>, Pritam Yadav<sup>4</sup>, Ajay- Nimbalkar<sup>5</sup>

<sup>1</sup>Associate Professor, S. B. Patil College of Engineering, Indapur, Pune-413106, MH, India.

<sup>2,3,4,5</sup> Student of S. B. Patil College of Engineering, Indapur, Pune-413106, MH, India.

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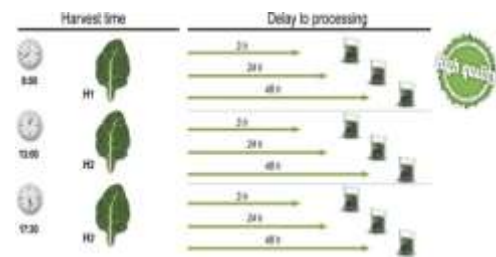
**Abstract-** This review paper represents the optimum design of harvester for farming a vegetables. In a farming of lettuce, spinach, and baby leaf type vegetables harvesting is by manually is bottle-neck work. And there will be the loss of time for harvesting the vegetables, as well as more cost is spend on the workers. And more amount of wastage of vegetable in manual farming process. so for reducing the wastage as well as time and money a prototype harvester is developed for head lettuce production. In these harvester consist of the cutting blade which cut the vegetable head at desired location. And then this cutted vegetable is lifted in container by using conveyor belt. A cutting component is band saw belt is used. Cutter and transport belt is drive by the electric power. so we used the power unit for this harvester. For cutting and lifting 12V DC motor will be used. Movement of this harvester by manually. There is a provision to position the cutter height according to the, type of vegetable.

**Key Words:** Requirement Mechanism, Methods, Quality, Labour cost, working principle.

### 1 INTRODUCTION

The harvesting process of baby spinach, lettuce like vegetables is normally a time consuming by manual harvesting. And most of the vegetables quality as well as damage to the vegetables, due to the improper harvesting of vegetables. and this are happen due to the lack of skills of workers. Quality is decreased due to more time required for harvesting. Baby leaves and spinach has become a most popular and profitable vegetable due to the high demand for human healthy and convenient life. The quality and life of spinach after harvesting affected by a pre-harvest factors like as a harvesting time and proper harvesting. The time for to harvest the spinach, lettuce, etc.. Is affected on the quality of the fresh vegetables (Yolanda Garrido, 2014) [1]. Lettuce, spinach is the vegetables for ready to use for kitchen and highly both in production and economic value of vegetables. New leaves using baby-leaf spinach at a normal stage and multi-leaf spinach at a mature stage have been developed. As need high 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 flavor of fresh -cut vegetables or vanish the quality of vegetables (María C. Luna,2011)[2].



**FIG-1: HARVESTING TIME AND QUALITY OF SPINACH**

In a developing cities there will be the market which sales the vegetables of ready to used fresh vegetables, have an 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 (MarjaLehto,2010)[4] About 20,900ha of the lettuce are produced in one year in Japan. In that winter season lettuce is grown in paddy or cover fields with four rows per bed cultural system, using overall mulching and plastic-tunnel. The lettuce seeds has been are transplanted in a zigzag pattern and with hill distance between them and inter row space is varying from the 27cm to 40cm. Normally in farming practices in lettuce production like as soil preparation, transplantation, and insect pest management has been mechanized. vegetables is still harvested by manually or hand-cut is stopped and reduced the cost invest on labor. Working hours for to producing a 1 ha of lettuce which is 670h, or 32 percent of which involves the harvesting work. The need of this of harvesting depending on the availability of skilled labor. So in advanced country there is the lack of human labor for farming operation. In this situation, the Harvesting of vegetables is has been bottle-neck of cost reduction. These manual harvesting of vegetables harvesting was to replace or the hand cutter-trimmer, with the machine. which increase the production of farming products and reduce the cost for it (Van Nguyen Nang, 2014) [5].

## 2. METHODS AND MATERIAL

### 2.1. Conventional harvesting of vegetables

Lettuce transplantation starting at the September ending and then continues to the February beginning. Harvesting of lettuce is normally from the starting of November to the April. The harvesting of lettuce when temperatures is decrease, Rows of lettuce are covered with plastic film tunnels to minimizing the effect, of cold environment on the growth of vegetables. However, this lettuce farming has been involved much in the growth difference between the inner and outer rows of lettuce. Once the harvesting of lettuce or spinach head is before 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 about a week for to do the second harvesting of the outer rows. Then the lettuces are selecting and then cutting 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 spinach leaves, then this leaves is packed in the container which made by plastic. Each container has been containing of two or three layers of 12e18 lettuce heads depending on the lettuce head sizes. The heads of lettuce are cut under the last leaf, cutted to remain there will be the three to five wrapper leaves, then the cutted lettuce has been packed in container and transferred to storage. The stored lettuce are then cutted 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 shipping. After the harvesting of lettuce the bed will be again used for transplantation of lettuce.(Van Nguyen Nang, 2014) [5].



FIG-2: CONVENTIONAL HARVESTING PRACTICES OF HEAD LETTUCE IN SHIZUOKA PREFERCTUR

### 3. DESIGNING CONCEPT OF HARVESTOR

Normally 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 study, 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 electric motor for drive the cutter and conveyor belt so the, electric motors are well known as 'Basic Prime movers' for Engineering Applications. Electric motors are available at different 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 electric motor.(S. G. Kolgiri,2013)[15]

### 3.1 Requirement from harvester

- [1] To mechanized the once-over harvesting of many-rows of winter lettuce
- [2] Injure or damage and spot the heads as minimum;
- [3] Less damage for mulching;
- [4] For improving the working position of labor;
- [5] For cheaper pack technique, lettuce heads will be shorten to remove unwanted wrapper leaves, packed and dissipated the latex sap at the packing station

### 4. WORKING PRINCIPLE

The harvester work as follows:

- [1] Moving forward: the wheels are provided for movement manually
- [2] Cutting: for cutting of vegetables band saw blade cutter is used
- [3] Lifting of vegetables: conveyor belt is used for lifting of cut vegetables
- [4] Power source: For 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 basket

### 5. CONCLUSION

By using these harvesting machine we reduce time required for harvesting of vegetables as compare to the previous designs of harvester. As well as by manually harvesting there will be a more money and time required,

so we eliminate them. An acre of field contains nearly 5000 trees. Workers has requires a payment of 5000 for the everyday of the work on the caesarians fields. Using this vegetable harvesting machine, we can cut a many acre of vegetables farm within a less time. So this harvester notably saves manpower, money and time. By using this harvesting machine, we can trimmed down the multiple Vegetables at a in few hours. This increase the speed of harvesting of vegetables. This machine is an excellent choice for harvesting lettuce, spinach, and baby leaves, etc. Replacement of manual harvesting, which taking of a u more time and money.

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