

## Onion Leaf Cutting Machine.

Vaibhav K. Kale<sup>1</sup>, Deepak A. Kawade<sup>2</sup>, Tushar D. Shinde<sup>3</sup>, Pavan S Vhanamane<sup>4</sup>, Keshav Pagar<sup>5</sup>.

<sup>1, 2, 3, 4</sup>Student B.E., Dept. of Mechanical Engineering, GCOERC, Nashik (M.S), India

<sup>5</sup> Assistant prof, Dept. of Mechanical Engineering, GCOERC, Nashik (M.S), India

\*\*\*

**Abstract** - In a field harvester and trimmer for root crops having foliage tops growing from the crowns of the crop to be harvested and trimmed, such as large bulbous onions, turnips, parsnips and rutabagas. This project is intended to discuss the design leaf cutting machine. This machine can be used for the agricultural purpose and it can be also employed in the food industries. Leaf cutting machine works on conveyer belt and cutter arrangement. Onions are fed through feeding conveyer belt into the machine. India is world's second largest Onion harvested. But yet Farmers processes onion by hand labor after harvest to remove the leaves and roots. This operation is referred to as topping which is time consuming and They Can't afford New Techniques Because of the cost of Appraisal Our Motive is to supply them with effective and efficient method for harvesting to reduce human effort without damaging the onion, Efforts to date have all been in the direction of large and expensive machinery and none of these has as yet been perfected so as to reach the market. A Prototype aims at cutting leaf of onion using conveyer belt and cutters to cut onions which can be collected in trays for further processing or packaging.

**Key Words:** Agricultural machinery, onion stem cutting, conveyer, cutter.

### 1. INTRODUCTION

Onion is an extremely important vegetable crop in India not only for internal consumption but also highest foreign exchange earner among the fruits and vegetable. Being an essential food items, India ranks second in global onion production after China and with an annual production of 16 to 17 million tons accounts for around 20% of global production. Annual turnover on Indian onion market in more than 10,000 corers and Maharashtra contributes nearly 30% in it. At the present times onion are processed by hand labor after harvest to remove leaves and roots. This operation is referred as topping. Hand topping has obvious disadvantages including both cost and unclue length of time necessary to process a large quantity of onions. However, in recent times it is becoming increasingly difficult to find sufficient labor to do the job. As the result the grower cannot always depend upon harvesting his entire crop when it is ripe for harvest.

Further, what labor there is available is unskilled and uninterested in doing an efficient job. A fair proportion of the onions that are hand topped with this labor are non-uniform and many are damaged to the extent of being unmarketable. The inherent lower productivity in sub-tropical countries

vis-à-vis European counties, shortage and high prices of quality seeds, high incidence of pests and diseases typical under tropical conditions, moisture stress or excess rains during critical growth stages are factors constraining yield. Wide price fluctuations make it a risky crop discouraging large scale adoption of input intensive production techniques and good management practices by farmers. In India onion is grown in three crop seasons, namely kharif (harvested in October-November), late kharif (January-February) and rabbi (April – May). Rabi season crop is the largest accounting for about 60 percent of annual production with kharif and late kharif accounting for about 20 percent each. Major producing states are Maharashtra, Karnataka, Madhya Pradesh, Andhra Pradesh, Bihar, Gujarat, Rajasthan and Haryana, which together account for 85 percent of total production.

#### 1.1. Problem statement

At the present times onion are processed by hand labor after harvest to remove leaves and roots. This operation is referred as topping. Hand topping has obvious disadvantages including both cost and unequal length of time necessary to process a large quantity of onions. However, in recent times it is becoming increasingly difficult to find sufficient labor to do the job. As the result the grower cannot always depend upon harvesting his entire crop when it is ripe for harvest. Further, what labor there is available is unskilled and uninterested in doing an efficient job. A fair proportion of the onions that are hand topped with this labor are non-uniform and many are damaged to the extent of being unmarketable. Hence we are trying to do the "Onion Leaf Cutting Machine".

#### 1.2. Objectives

The given objectives are to be predicted while doing this project work are given below,

- To reduce human effort and labor cost.
- To replace traditional method with efficient one.
- To reduce time period between harvesting and packaging of onion.
- To leave onion unharmed during process with safety to operator.
- To design and fabricate semi-automated machine which will help the farmers in sorting out the onion effectively.
- It will reduce the yielding cost of farmers & it will increase his profit in trading.

### 1.3. Process Flow & Methodology

Methodology is the Systematic, Theoretical analysis of the methods applied to a field of study or the theoretical analysis of the body of methods and principles associated with a branch of study. The below flow chart shows the sequential operation/steps that will be performed during the project process.



### 2. LITERATURE REVIEW

Mr. Nikhil O. Singh et.al. [2016] done the work on Tomato Sorting Machine (TSM) is a machine used to effectively sort the tomatoes on Size based sorting. This machine can be used for the agricultural purpose and it can be also employed in the food industries. TSM will sort the tomatoes in three grades based on their size i.e. Small, Medium and Large. TSM works on belt and pulley arrangement. Tomatoes are fed through feeding tray into the machine.

Abd El-Rahman, et.al [2017] describe that from Magda M. Agric. Eng. Res. Inst. (AEnRI); Agric. Res. Center (ARC), Dokki, Giza. Egypt. done the work on develop a small cylinder type grading machine to suit grading of onion sets crop. Two operating parameters each of four levels were studied. The studied parameters included, riddle revolving speed 35, 45, 55 and 65 rpm (0.366, 0.471, 0.576, and 0.680 m/s), and riddles feeding rates (75, 100, 125 and 150 kg/h). The effect of machine parameters on grading efficiency (%), grading productivity (kg/h) and the mechanical damage

percentage, were also considered. Results showed that the machine is quite successful for grading onion sets. The best result was obtained at 55 rpm riddles revolving speeds and 125 kg/h riddles feeding rate. At these values, maximum grading efficiency of 94.34% and permissible mechanical damage of onion sets 4.66% were obtained. These results proved that, the proper operating parameters corresponded with theoretical considerations as the relevant for machine operation

Dattatraya Londhe et.al. [2006] done the work on grading of agricultural produce especially the fruits and vegetables has become a prerequisite of trading across borders. In India mostly fruit growers grade the fruit manually. Manual grading was carried out by trained operators who considered a number of grading factors and fruit were separated according to their physical quality. Manually grading was costly and grading operation was affected due to shortage of labor in peak seasons. Human operations may be inconsistent, less efficient and time consuming. New trends in marketing as specified by World Trade Organization (WTO) demand high quality graded products. Farmers are looking forward to having an appropriate agricultural produce-grading machine in order to alleviate the labor shortage, save time and improve graded product's quality. Grading of fruits is a very important operation as it fetches high price to the grower and improves packaging, handling and brings an overall improvement in marketing system. The fruits are generally graded on basis of size and graded fruits are more welcome in export market. Grading could reduce handling losses during transportation.

### 3. CONCEPT AND WORKING PRINCIPLE

Fig -1: Concept Drawing.

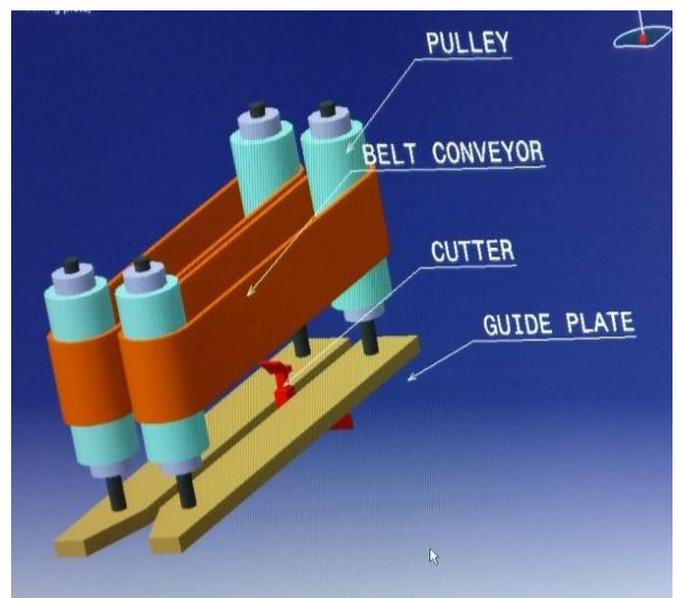
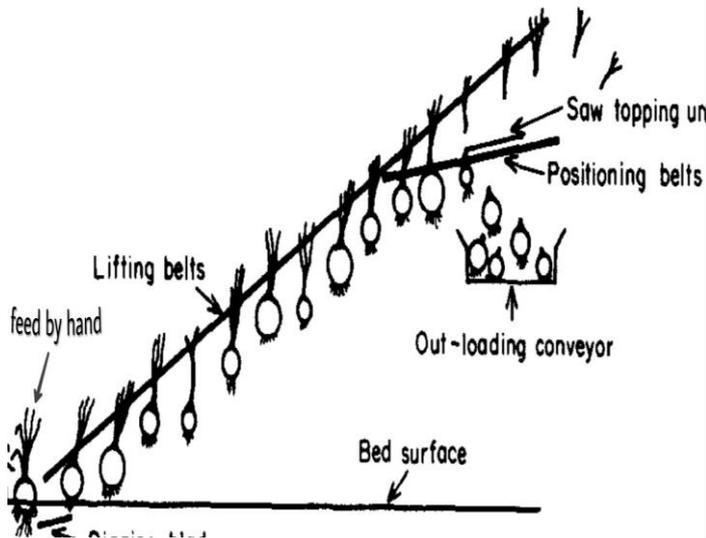


Fig -2: Catia Model.



This project consists of cutter & belt conveyer assembly which is mounted on end side of movable platform on M.S. frame. The rotary cutters are mounted at the top side of the belt conveyer system. When we required operating the onion leaf cutter/remover, we can push the onion on conveyer which will move in forward direction. When there is approach of onion to cutter due electric cutter it will cut the leaf of onion. Belt conveyer system can be supported by support of four pedestal bearing operated by using electric gear motor. After cutting of onion & leaf are separated & collected in tray. Fig. shows the semi-automatic onion leaf cutting machine.

#### 4. ADVANTAGES, LIMITATION & APPLICATION.

##### 4.1 ADVANTAGES

- To reduce Human effort and Labor cost.
- To replace traditional method with efficient one.
- To reduce time period between harvesting and packaging.
- To leave onion unharmed during process with safety to operator.
- To design and fabricate semi-automated machine which will help the farmers in sorting out the onion effectively.
- It will reduce the yielding cost of farmers & it will increase his profit in trading.
- The operation of the pneumatic Weeding machine is well controlled.
- Well balanced system.
- It approximately having higher efficiency that of old system.
- Only simple support structures are required Design & fabrication is easy.

- More accurate and economical in large scale cutting operations.
- Faster cutting speed than conventional methods.
- It increases the safety and working condition during cutting.
- Effective for longer period cutting Operations.
- Material is easily available for spare parts.

##### 4.2 Limitation

- Necessary of Electricity.
- In rural area there is load-shedding problem.
- Maintenance is required.
- Setup cost is high.

##### 4.3 Application

It is generally use for cutting of onion, beat, garlic leaf & vegetables.



Fig -3: Application of leaf cutting machine.

#### 5. CONCLUSIONS

This paper presents theoretical aspects of onion leaf cutting machine as conventional way of cutting root and stem require more cost and manpower & method is fully based on the work of human hence more time consuming so it requires more and other cost is also very high.

So we are going to invent a machine which minimize that cost and time for onion root and cutting and the process is also simple.

Also we succeed to make it very small and to all farmers and it increases the speed of work so our objective is fulfilled in this project.

**REFERENCES**

- [1] R. WINGATE-HILL, "Performance of a Top-lifting Harvester for Early Onions," J. agric. Eugng Rrs. (1977) 22, 271-281
- [2] Mutke Suraj Rajendra ET AL., "Design and Manufacturing April 2017 | IJIRT | Volume 3 Issue 11 | ISSN: 2349-6002.
- [3] Cropsey, M. G.; Lunde, R. N.; Stafford, D. E. Machine harvests gladiolus corms. Agric. Engng, St., Mich., 1954 35
- [4] Culpin, C. Profitable Farm Mechanisation, Second edition. London: Crosby Lockwood, 1968.
- [5] Wiugate-Hill, R.; Blii, D. J.; Smith, G. W.; Woodmore, P. J. Mechanisms for removing green, tops from onions. N.S.W. Dept. agric., agric. Engng Centre, Tech. Report 75/4, 1975



**Mr. Pavan S. Vhanmane**, was born in India. He is pursuing his Bachelor's degree in Mechanical Engineering from Savitribai Phule Pune University. His current interests include Product Design & Development.



**Mr. Keshav Pagar**, was born in India. He completed Bachelor & Master of Engineering in Mechanical Engineering from University of Pune, currently Assistant Professor in Guru Gobind Singh College of Engineering and Research Centre, Nashik.

**ACKNOWLEDGEMENT**

The authors are thankful to Guru gobind singh college of Engineering & Research Center, Nashik, (GCOERC, Nashik) and her staff; and also to Prof. Keshav Pagar, Dr Candrashekhar Mohod, Faculty of Mechanical Engineering Department, Savitribai University, Pune, for providing the necessary facilities for the preparation of the paper.

**BIOGRAPHIES**



**Mr. Vaibhav K. Kale**, was born in India. He is pursuing his Bachelor's degree in Mechanical Engineering from Savitribai Phule Pune University. His current interests Product Design & Development.



**Mr. Deepak A. Kawade**, was born in India. He is pursuing his Bachelor's degree in Mechanical Engineering from Savitribai Phule Pune University. His current interests in Manufacturing and Industrial Management.



**Mr. Tushar D. Shinde**, was born in India. He is pursuing his Bachelor's degree in Mechanical Engineering from Savitribai Phule Pune University. His current interests Product Design & Development and Industrial Management.