

Onion harvesting machine

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ABSTRACT

Onion harvesting machine is based on reduction in effort required for harvesting of onion as well as for saving cost required in harvesting, especially for small scale farming. The purpose of designing and fabrication of such small equipment is that it full fills requirements of harvesting and reduces the cost of it. Onion harvesting machine contains simple mechanisms with effective manually handling system that need only human efforts for operations. The purpose behind this is to just reduce production cost of onion manufacturing by that farmer can get more output & income especially considering small scale farming.

Keywords: harvesting, fabrication, mechanism.

ARTICLE INFO

Article History

Received: 6th June 2019

Received in revised form :

6th June 2019

Accepted: 8th June 2019

Published online :

8th June 2019

I. INTRODUCTION

Onion is an important vegetable crop in India and is an integral component of Indian culinary. Being an essential food item, it is also a highly politically sensitive commodity. This report analyses the production, consumption, trade and price behaviour of onion in India. India ranks second in global onion production after China and with an annual production of 16 to 17 million tonnes accounts for around 20% of global production. However, Indian onion yield is one of the lowest. The inherent lower productivity in sub-tropical countries vis-à-vis European countries, 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 farmer In India onion is grown in three crop seasons, namely kharif (harvested in October-November), late kharif

(January February) and rabi (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. It shows us that there is continuous growth in onion production in India. But there is using traditional onion harvesting method which is more time consuming and more labor require And now a days there is big labour shortage issue in this field. In India specially Maharashtra, Gujrat there is small size of farm where used to production of onion in which available large size onion harvesting machine are not useful also not economical. So overcome this problem we try to design and manufacture manual operating and useful to small field machine. Onion is the most important crop in India. The harvesting of onion crop is rigorous and requires huge amount of manpower and time. One of the main reasons of low productivity is insufficient power availability

on the farm and low level of farm mechanization. This is especially true for India. The package of modern technology, improved seed and fertilizers, use of efficient and economical farm implements, machines and suitable form of farm power is very important. Production suffers because of improper seed bed preparation, delay in sowing and harvesting. Mechanization enables the conservation of input through precision metering, insuring better distribution, reducing quantity needed for better response and prevention of losses or wastage of inputs applied.

II. PROBLEM STATEMENT

Traditional onion harvesting process is time consuming. In this process first onion pulled up by hand manually gather them latter cut its steam by using blades. In this process more time and more man power require but now a days there is shortage of man power.by another method there is use huge machine use for onion harvesting but it is not economical for small fields.

a. OBJECTIVES

1. To reduce human effort.
2. To increase the capacity of onion harvesting.
3. To increase the efficiency of onion harvesting.
4. To reduce the cost and time of onion harvesting.
5. To design a onion harvesting machine for setting up small scale, low cost rural industry. After identification of small scale, low cost onion harvesting machines, the performance of the machines will be tested for commercial applications.
6. After identification of small scale, low cost onion harvesting machines, the performance of the machines will be tested for commercial applications. If performance is found satisfactory, the machines would be used for commercial application.

III. CONSTRUCTION

Methodology

1. Data collection phase involves the collection of reference material for the project concept and the collection of research paper regarding the project topic.

2. The system design comprises of development of the mechanism so that the project can perform the desired operation.
3. The parts mentioned in the part list will be designed under the given system of forces and appropriate dimensions will be derived. The standard part will be selected from design handbook
4. Production drawings of the parts are prepared using CAD software, CATIA with appropriate dimensions.
5. Materials are selected as per the required dimensions and properties. Part process planning is done to decide the process of manufacturing and appropriate machine for the same.
6. Parts are produced as per the parts drawing.
7. Machine is done as per assembly drawing and trial is conducted on project device for evaluating performance.
8. Report preparation activity is carried out during the above phases.

Working method

The present research work has been carried out to bring out the reliable solution for harvesting of onion crop. The harvesting of onion crop is the labor intensive operation. The attempt has been made to design the harvester for the low power capacity tractors range in the 15 to 20 hp. The size of the harvester has been decided with respect to the agro technical features of the crop. The working width of the harvester has been worked out to be 75cm. The depth of operation for the onion crop has been decided up to 10 cm. The width and depth ratio was comes to 7.5:1 which is fit to the design. The soil mass load on the harvester was worked out to be 1.35 N/cm². The volume of soil discharge per second on the web has been estimated to be 0.023 m³/sec for the travel speed of 3.0km/h. The total capacity of the harvester in respect of the working in the soil has worked out to be 124tones/hr. accordingly the materials for the fabrication has been decided as per the BIS standard. The PTO power requirement for effective working of the harvester has been optimize from the travel speed, the total soil load and the discharge of soil mass and the capacity of soil to be work. The estimated power requirement for the onion harvester is comes to 11 to 13 hp. The estimate forces on blade of horizontal have

440.7 and vertical has 77.48. Bending moment of blade and onion crop harvester is safely for the working of black cotton soil. The total weight of the machine was calculated as per the proposed engineering drawing comes to be 90.50 kg. The estimated cost of the onion harvester was worked out to be Rs21444.



Fig: Onion harvesting Machine

IV. CONCLUSION

In this project we have designed the simplest method of onion root and stem cutting process. In conventional way of cutting root and stem we require more cost and manpower comparatively & this method is fully based on the work of human effort hence more time consuming so it requires more workers and other cost is also very high. So we have invented a machine which will minimize that cost and time for onion root and stem cutting and the process is also simple. Also we succeed to make it very small and affordable to all farmers and it increases the speed of work so our objective is fulfilled in this project.

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