

## TRACTOR OPERATED ONION HARVESTER : DIGGING SYSTEM

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**Abstract-** India is an agriculture based country in 70% people depends on the outcome of farming. But if you observe that with the increase in population the farm gets distributed among the family and because of this the farmers in India held averagely only 2 acre farm. also economically, farmers are very poor due to which they are unable to purchase tractors or other costly farming equipment hence they use traditional way of farming. Basically many farmers in india still also use bullocks , horses for farming operation.this will not satisfy the need of energy requirement of the farming as compared to other countries in the world.So we are thinking that humans and animal efforts can be replaced by some advanced mechanization which will be suitable for small scale farmer from economical and effort point of view.

**Keywords:** *Onion Harvester, Digger, Cultivation*

### INTRODUCTION

Agriculture occupies a key position in Indian economy. It ntributes about 40% of the gross national product and provides a source of live-hood to nearly 79% of working population of the country. The delopment of agriculture ,therefore, has been accorded a high priority into planned development of the country with the help of modern technology in agricultural production. Impact of new agriculture tecnology on farm gives the more income. Indian agriculture has witnessed significant changes in production technology through the introduction and spread of high yielding varieties of crops and intensive applications of modern inputs in farming. This process of transformation in agricultural form a traditional to a modern state has brought in agriculture because of the higher rate of return to such investment.

The daily need of man could not be easier in the desired proportion . The main reason for this is the high rate of our population growth. So long as the rate of population growth if not brought down, it is difficult to raise the

standard of living. Therefore,it is necessary to have changed the planning on agriculture and increases agriculture products for the daily need of people.It is also useful to improve our economy because 80% people depend on the farm. Therefore to meet the need of people it is essential to increase the agriculture productivity . Indian economy is agro based and agro is fully dependent on weather. So to meet growing need of food grain we have to use fertilizers, hybrids seeds, and various types of machines to take more yield from the available land. So keeping this view in mind we have develop the machines for harvesting onions directly from farm with minimum time and efforts.

### LITERATURE SURVEY

Among all horticultural produces in the country, vegetables constitute 55.8 percent share and are the most important food next only to cereals and milk. India is the second largest producer of vegetables in the world. But the productivity of vegetables is low compared to the average productivity being achieved in several Asian countries (Anonymous 2004-05). India occupies first position in the production of cauliflower, second in onion and third in cabbage. Onion cultivation involves considerable stoop labour, and the harvesting operation may consume as much as 50 per cent of the total production cost. Traditionally, the bulbs after digging are left in the field for about a week for drying after which the tops are removed and the crop is left in shade again for curing for about a week. The labour requirement is thus, very high for the conventional practice, which makes it costly too.

Harvesting of onion at the stage of maturity is a very important factor in deciding storage life of onion, as the bulbs may be stored for about six months. Besides, it is necessary to complete the harvesting operation within specified time limits. Very limited information on the physical and mechanical properties of the onion crop relevant to design and development of mechanical digger are available. Therefore information on digging of other

crops such as potato and other root & bulb crop has been reviewed. The available information is presented under headings: a) Cultural practices, b) Engineering properties of crops related to mechanical digging, and c) Design considerations of mechanical digger.

### PROBLEM STATEMENT

Onion harvesting operation is tedious, time consuming and labours intensive which increases cost of operation.

1. The tractor operated onion harvester is needed to be developed to reduce the effort of labors dependency and reducing time consumption in onion collecting operation.
2. The small scale farmer can't purchase the whole system.

### OBJECTIVE

1. To reduce cost and time required for harvesting of onions.
2. To avoid the damage of bulbs.
3. To develop light weight of digger
4. To avoid time consumption

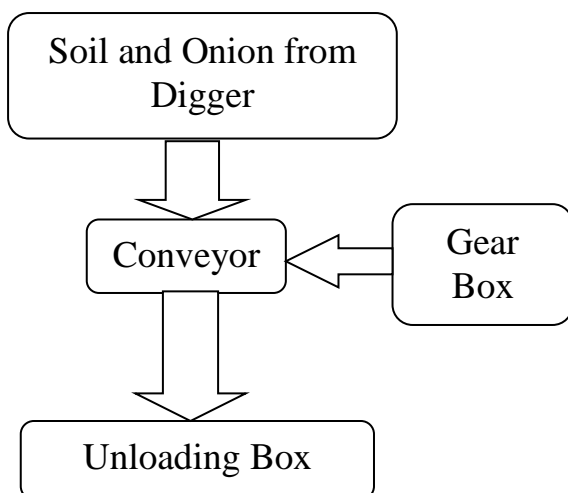
### SCOPE

- 1.Reduce in damage of bulbs due to wrong handling.
- 2.Portable system
- 3.Accurate storing of onion to avoid time consumption
- 4.Reduce the labor dependency.

### DESIGNING AND ANALYSIS OF MECHANISM

Digging system consist of digging blades attached on the front of plate. This blades goes in the ground. Onions along with soil come into the digger. And then convey it to the conveyer attached to digger.

### BLOCK DIAGRAM:



### FUNCTIONAL REQUIREMENT OF DIGGER

The following functional requirements were set for the design of digger:

- i. The machine should dig onion from the field in 1m width with row spacing 150 mm. This is because the tractor is 2 m wide and the recommended row to row spacing of onion crop is 150 mm.
- ii. It should be operated by tractors of 35 to 45 hp range as this is the common size of tractor available on Indian farm.
- iii. The onion should be left uncovered over the soil surface to the rear of the tractor in a windrow and left on the field for curing; the windrowed onions are later on picked up manually with minimum possible labour requirement.
- iv. The onion damage in terms of cut, crush, sliced and bruised tubers should be as low as possible.
- v. The damage to the leaves (tops) should be minimum.
- vi. The onion should be dug up from the field in such a way that the minimum volume of soil is removed without causing any damage to the bulbs.
- vii. It should have less number of wearing parts.
- viii. It should be simple in design and construction and efficient in digging onions

### ADVANTAGES

#### 1. Innovative Concept

#### 2. Financial

Requires less cost than manual harvesting of the onions

#### 3. Easy to attach and de-attach

It is easy to attach and de-attach to any tractor.

#### 4. Time

Reduces overall time requires for harvesting as compared to manual harvesting

#### 5. Reduces Human Fatigue:

Harvesting onion requires only single operator and less human fatigue compared to manual harvesting

#### 6. Cost effective

Even small scale farmer can easily purchase this mechanism

#### 7. Harvesting multiple crops:

It can be used to harvest alternative crops like potato, garlic, beet, ginger etc.

### EXPECTED OUTCOME

1. As we expected less number of labour required for mechanically, harvesting than manual harvesting.
- 2.Reduction in time by using tractor operated onion harvester mechanism.
3. The damage of onion bulbs is reduce and reduces cost of harvesting due to attachment of onion harvester mechanism.

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and Ling Zhao<sup>1</sup> "Design and Experiment of a Replant Crops Separating Garlic Harvester"