

Fabrication of Potato Harvester

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ABSTRACT

The main purpose of our Project is to help small scale farmers who having land area less than 5 acres by designing small scale harvester machine to harvest vegetables very efficiently. Our project work will focus on ease of harvesting operation to the small scale farmers for harvesting varieties of grain in less time and at low cost by considering different factors such as cost of equipment, ease of operation and time of operation. This machine is compact and is designed to harvest one row at a time. The potato harvester dig the potatoes by the digger web. The machine harvest the potatoes by lifting the potatoes from the bed using a share. Soil and potatoes are transferred onto a series of webs where the soil and the potatoes are sieved out and the potatoes are separated from the soil. The future work is also considered for the development or it can be connect to any vehicle that can drive easily that upturns the productivity of the product and diminishes the human effort.

Keywords: Harvester machine, Design to harvest one row

1: INTRODUCTION

Agriculture plays a dynamic role in Indian economy. So any development in the productivity related task help to escalation Indian farmer's status and economy. Although agro industry is accreted of lingering peace. The sole culprit for slogging in pace of accretion (in agro industry) is dependency on customary approaches and equipment.

Vegetable harvesters have been used to harvest underground vegetables in farms. There are various designs of tools and equipment used for harvesting the crops and threshing it separately. Sickles, hand tools and reapers for grain crops and diggers for tuber crops and rhizomes, operated with different power sources are used. Combine harvesters, both tractor mounted and self-propelled, are being very widely used for different grain crops.

Recently there has seen a shortage of skilled labour available for agriculture. Because of this shortage the farmers have transitioned to using harvestings. Cutting crop manually using labour but this method is very time lengthy and time consuming. The harvestings are available for purchase but because of their high costs, they are not affordable. However, agriculture groups make these available for rent on an hourly basis. But the small holding farm owners generally do not require the full-featured combine harvestings. Thus, there is a need for a smaller and efficient combine harvesting which would be more accessible and also considerably cheaper. The mission is to create a portable, user-friendly and low cost mini harvesting machine. The idea was to create a machine which is cheap and will reduce the labour required to harvest crops. This machine has the capability and the economic value for fulfilling the needs of farmers having small land holdings (less than 5 acres). This machine is cost effective and easy to maintain and repair for the farmer.

This project is attempted to show how we can atomise the potato harvesting in simple ways and using simple mechanism. The potato harvester dig the potatoes by the digger web. The machine harvest the potatoes by lifting the potatoes from the bed using a share. Soil and potatoes are transferred onto a series of webs where the soil and the potatoes are sieved out and the potatoes are separated from the soil.

2: LITERATURE REVIEW

Anderson, S., Allen It is machine which separate potatoes from soil. The vibration reaches relative separation speed but cause less damage on potato. Mechanical harvesting of potato had a greater influence on lifted,

unlifted and damaged tubers which was not favoured for crop use. The effect of the forward speed and chain speeds was remarkable on lifted and unlifted tubers. Root crops are grown below the surface of the ground, therefore it requires specially designed machines to dig and separate them from the soil. The subject of vibrating diggers has drawn the attention of many research. Several field and vegetables crops, from tubers and roots below the surface of the soil.

2.1 Manual harvesting: This is the traditional method of harvesting cassava using a hoe, cutlass or mattock to dig round the standing stem to pull out the root before detaching the uprooted roots from the base of the plant.



Fig 2.1 Manual harvesting of Potato.

2.2 Semi manual harvesting: An Ox-drawn potato lifter (OPL) was designed on the basis of the groundnut digger and the ordinary ox-plough. The digger is similar to a mouldboard plough. It consists of mild steel box frame, a bent tine for attaching mouldboard with the frame, mouldboard plough shaped part and a flat piece attached to the tip of the share, hitch assembly and handle. For operation, a pair of bullocks pulls the implement; the flat piece attached to the share tip penetrates in the soil and harvested crops along with the soil lumps slide over the mouldboard.



Fig 2.2 NARO ox-drawn potato lifter

2.3 Mechanical harvesting: Mechanical harvesting of taproot vegetables involves the use of a harvesting implement integrally hitched to a tractor to uproot the rooted vegetables. Manual effort is however required after the uprooting has been completed to collect and detach the root tubers. The following field requirements/conditions are also necessary to allow for an optimum mechanical taproot harvesting operation field free from hidden obstructions (rocks, roots, stumps etc. down to 40 cm deep) of sizes that can interfere with lifting the tubers; good weed control as weeds block the lifters.

3: OBJECTIVE OF PROJECT

- This method is used to reduce the time taken to dig and collect the underground vegetables from the ground.

- Machine is easy to assemble and disassemble.
- Effort of farmer is reduced by this machine.
- Wastage and damage of taproot vegetables can be reduced.
- Efficiency of the machine is more compared to manual methods.
- The machine maintenance and cost of the machine is low.

4: COMPONENTS USED

1. Frame: This is made of mild steel material. The whole parts are mounted on this frame structure with the suitable arrangement. Boring of bearing sizes and open bores done in one setting so as to align the bearings properly while assembling.

2. Spur gear: The spur gears, which are designed to transmit motion and power between parallel shafts, are the most economical gears in the power transmission industry. Spur gears or straight-cut gears are the simplest type of gear. They consist of a cylinder or disk with teeth projecting radially.

3. Internal spur gear: The internal gears are spur gears turned "inside out." In other words, the teeth are cut into the inside diameter while the outside diameter is kept smooth. This design allows for the driving pinion to rotate internal to the gear, which, in turn, allows for clean operation. Intended for light duty applications, these gears are available only in brass. When choosing a mating spur gear, always remember that the difference in the number of teeth between the internal gear and pinion should not be less than 15 or 12.

4. External spur gear: External spur gears are cylindrical gears with straight teeth parallel to the axis. They are used to transmit rotary motion between parallel shafts and the shafts rotate in opposite directions. They tend to be noisy at high speed as the two gear surfaces come into contact at once.

5. Bearing with bearing cap: The bearings are pressed smoothly to fit into the shafts because if hammered the bearing may develop cracks. Bearing is made upon steel material and bearing cap is mild steel.

6. Chain drive: This is a cycle chain sprocket. The chain sprocket is coupled with another generator shaft. The chain converts rotational power to pulling power, or pulling power to rotational power, by engaging with the sprocket.

7. Belt conveyor: A conveyor belt is the carrying medium of a belt conveyor system. A belt conveyor system consists of two or more pulleys with an endless loop of carrying medium the conveyor belt that rotates about them. One or both of the pulleys are powered, moving the belt and the material on the belt forward. The powered pulley is called the drive pulley while the unpowered pulley is called the idler pulley.

8. Shaft: A shaft is a rotating machine element, usually circular in cross section, which is used to transmit power from one part to another, or from a machine which produces power to a machine which absorbs power. The various members such as pulleys and gears are mounted on it.

5: WORKING PRINCIPLE

The components used for machine is listed above and fig shown below. As the machine moved forward, the shear blade split the ridges and the potatoes were dug out, and thrown on the conveyor. The conveyor is in rotating condition with the help of chain mechanism. The conveyor further transported these potatoes to the rear end of the cylindrical mesh. While digging the potatoes, soil clods came along with these potatoes. These soil clods got broken and dropped, due to the mesh provided in the cylinder.

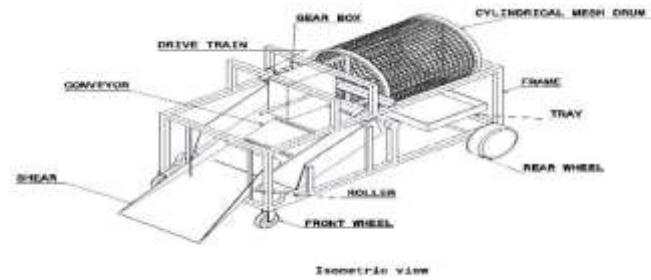


Fig5.1 Design of Potato Harvester



Fig 5.2 Fabricated of potato harvester

Section 6: ADVANTAGES

- This potato harvester machine can used for harvesting varieties of underground plants.
- The machine is suitable for all kinds of soil, such as sandy soil, clay soil and loam.
- The machine is with simple and compact structure and can connect with the tractors easily.
- This potato harvesting equipment can harvest the potatoes with the potato vine.
- Less man power require for operation.
- It can use for multipurpose.
- It saves the maximum time of operation than the manual.
- It completes the operation without damaging the potatoes.

7: CONCLUSION

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding, planning, purchasing, assembling and machining while doing this project work.

We are proud that we have completed the work with the limited time successfully. The “**FABRICATION OF VEGETABLE HARVESTER**” is working with satisfactory conditions. We are able to understand the difficulties in maintaining the tolerances and also quality.

We have done to our ability and skill making maximum use of available facilities. In conclusion remarks of our project work. Thus we have developed a “**FABRICATION OF VEGETABLE HARVESTER**”. By using more techniques, they can be modified and developed according to the applications.

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