

Fabrication of Rice Transplanter and Plant Sapling Machine

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ABSTRACT

Though many equipment's are available in the market, there is still a need for cost effective solution for rice transplanting and planting and planting of the saplings. This project is aimed at a low cost solution for farmers for rice transplanting without compromising on efficiency. The cost has been brought down by the use of a simple crank mechanism can be either manually operated or by a petrol engine when needed the equipment can be used for planting other saplings also.

Keywords : Rice Transplanting, Compromising, Efficiency, Plant Sapling

I. INTRODUCTION

Transplanting is one of the major process for establishment of paddy in India. In this method seed is sown in one place and seedlings after they have grown a little are transplanted to another. This is done in order to get higher yields and less weeding. Transplanting of rice is highly labour intensive and it may require 250-350 man-hours per hectares.

Seedling are prepared in nurseries where they grow for 15-20 days. After these seedling are been prepared, these are been transplanted manually by labour. The orientation of the labour at the time of transplanting is hazardous for their health. With manual transplanted the cost of production of rice also increases.

With the help of a Rice Transplanting Machine, the transplanted cost as well as time will decrease with increase in efficiency.

II. PROBLEM IDENTIFICATION

Many types of problems like fatigue, tiredness, pain in spiral cord and muscles etc. Following problems can take place by use of this conventional type of rice transplanting and plant sapling method

III. CONSTRUCTIONAL PARTS

1. PETROL ENGINE
2. CHAIN
3. WHEEL
4. L-SHAPE CHANNEL
5. SQUARE CHANNEL
6. M.S SHAFT
7. SHEET METAL
8. AUGER
9. SPROCKET

3.1 PETROL ENGINE:

A two-stroke (or two-cycle) engine is a type of internal combustion engine which completes a power cycle with two strokes (up and down movements) of the piston during only one crankshaft revolution. This is in contrast to a "four-stroke

engine", which requires four strokes of the piston to complete a power cycle during two crankshaft revolutions. In a two-stroke engine, the end of the combustion stroke and the beginning of the compression stroke happen simultaneously, with the intake and exhaust (or scavenging) functions occurring at the same time. Two-stroke engines often have a high power-to-weight ratio, power being available in a narrow range of rotational speeds called the "power band". Compared to four-stroke engines, two-stroke engines have a greatly reduced number of moving parts, and so can be more compact and significantly lighter.

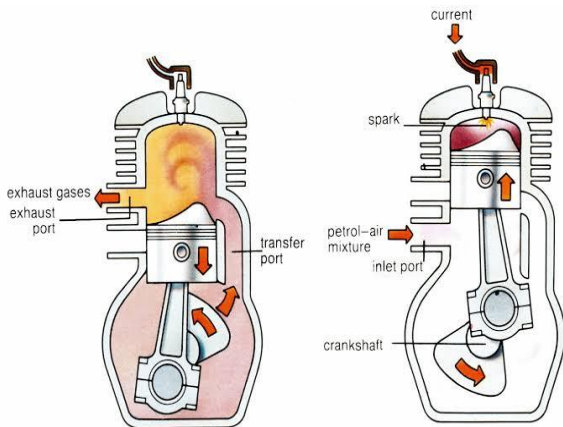


Fig : 3.1 Petrol Engine

3.2 CHAIN:

A chain is a serial assembly of connected pieces, called links, typically made of metal, with an overall character similar to that of a rope in that it is flexible and curved in compression but linear, rigid, and load-bearing in tension. A chain may consist of two or more links.



Fig 3.2 Chain

3.3 WHEEL:

The wheel assembly generally consists of hub, disc or spokes, rim, tyre and tube. The tricycle may be towed without the support. But it cannot possible without the wheels. The wheels not only support the weight of the vehicle, but also it provides cushioning effect and copes with steering control. The rear wheels transmit the power and the front wheel steer the tricycle. All the wheels must withstand side thrusts and also braking stresses.

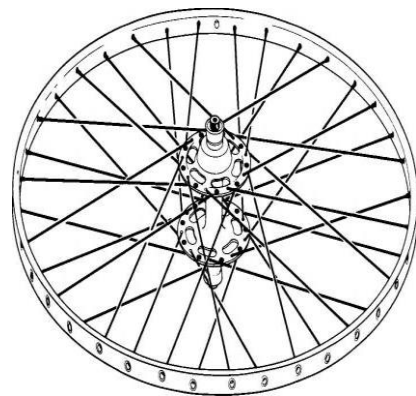


Fig: 3.3 Sprocket

3.4 AUGER:



Fig : 3.4 Auger

A drilling rig is a machine that creates holes in the earth's subsurface. Drilling rigs can be massive structures housing equipment used to drill water wells, oil wells, or natural gas extraction wells, or they can be small enough to be moved manually by one person and such are called augers. Drilling rigs can sample subsurface mineral deposits, test rock, soil

and groundwater physical properties, and also can be used to install sub-surface fabrications, such as underground utilities, instrumentation, tunnels or wells. Drilling rigs can be mobile equipment mounted on trucks, tracks or trailers, or more permanent land or marine-based structures (such as oil platforms, commonly called 'offshore oil rigs' even if they don't contain a drilling rig). The term "rig" therefore generally refers to the complex equipment that is used to penetrate the surface of the Earth's crust.

3.5 SPROCKET:

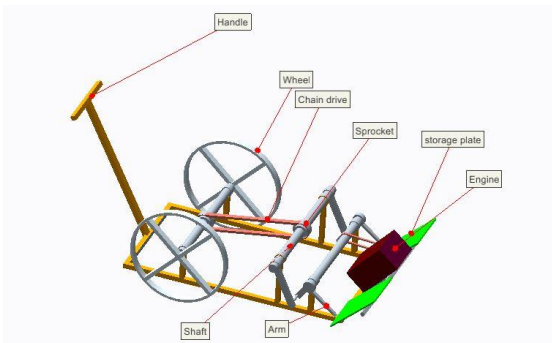


Fig: 3.5 Sprocket

A sprocket or sprocket-wheel is a profiled wheel with teeth, or cogs, that mesh with a chain, track or other perforated or indented material. The name 'sprocket' applies generally to any wheel upon which radial projections engage a chain passing over it. It is distinguished from a gear in that sprockets are never meshed together directly, and differs from a pulley in that sprockets have teeth and pulleys are smooth.

IV. RESULTS AND DISCUSSION

A. Design diagram



B. Working principle

Rice transplanter:

In this method seed is sown in one place and the seedlings after they have grown a little are transplanted to another. This is done in order to get higher yields and less weeding. In Sri Lanka, the extent of transplanted rice is decreasing due to the scarcity of labour, resources and reduction in cultivation of 4-4 ½ month rice varieties. Manualtransplanting is labour intensive and requires 250 -350 man hours per hectare that is 25% of the total labour requirement of the crop. Paddy transplanting machine has problems of poor traction, sinkage and steerability. Efficient working of self-propelled rice transplanter requires a suitable puddled soil condition, optimum depth of puddling, degree of puddling and soil strength of puddled field. Transplanting will reduce the ability to withstand moisture stress. Transplanting is recommended for 4-4 ½ month varieties and when 3month varieties are transplanted it should be planted with young seedlings. It is recommended to transplant when land preparation is not up to standard and water management is poor. The reason why transplanting of long age varieties show higher yield compared to broadcasting is that transplanting reduces the excessive build up of vegetative biomass due to 427transplanting shock. The spacing of transplanted paddy varies with the age of the variety. For long age varieties (4 -4 ½ months) and short age varieties (3 -3 ½ months) best spacing are 20 x 20 cm² and 20 x 15cm², respectively. A hill should be planted with 2 - 4 healthy seedlings. If random transplanting is practiced, hill density of about 25cm² for 4 -4 ½ month varieties and 30 -35 cm² for 3 -3 ½ month varieties is optimum. For transplanted rice seedling age is a major factor in determining yield. The set back of growth due to uprooting and replanting of seedlings, transplanting shock is occurred. This increases with the increase of age of seedling of the variety. In general, the effect of transplanting on yield

increases, but it decreases with age. Seedling age (in calendar days) also varies with the environmental condition and the type of nursery. The physical and bio-chemical factors would set a minimum and maximum age for a particular nursery. Minimum age of a seedling for transplanting would be about 12-14 days. For a three-month age crop seedling age should not be increased beyond 15 days while for a 4-month crop it is about 21 days. Seedling age of a dapog nursery should not exceed 14 days.

Plant sapling:

When the engine starts to run with the help of a kicker. Then, the engine is switched ON. The auger is connected to the engine which is used to row the plants on the ground. The auger removes the soil in a rowing place and the plant is sown on that drilled place. Then, the soil is closed by the auger itself.

C. SPECIFICATIONS OF COMPONENT

➤ Engine speed	- 500rpm
➤ Length of plant stand	- 150mm
➤ Auger length	- 100mm
➤ Chain teeth	- 100teeth
➤ Sprocket diameter	- 50mm
➤ Arm length	- 70mm
➤ Diameter of wheel	- 200mm
➤ Thickness of frame	- 5mm
➤ Width of frame	- 20mm
➤ Sheet metal thickness	- 1mm
➤ Diameter of shaft	- 25mm
➤ Length of machine	- 900mm
➤ Width of machine	- 100mm

D. ADVANTAGES

1. Timely transplanting of seedling
2. Ensure uniform spacing and optimum plant density with 2-3 saplings
3. Cost of machine is less
4. Efficient use of resource by saving on cost, labour and time
5. Easy to operate the machine

Time saving

6. Help to medium level farmer

E. PHOTOGRAPHY



V. CONCLUSION

The newly developed system is also effective as compared to systems available in the market. Rice transplanters and plant sapling machines have simple construction and a fewer number of parts, which minimizes the cost of development for them. The transplanter mechanism is used to carry out the motion of the arms. The total cost required to develop the system is also less. The rice transplanter machine is more flexible than machines available in the market at starting cost.

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