MINI PADDY TRANSPLANTER

Sutharsan M\textsuperscript{1,2}, Arunachalam J\textsuperscript{1}, Askar Ali J\textsuperscript{1}, Buvaneshkumar C\textsuperscript{1}
\textsuperscript{1,2}Assistant Professor, Department of Mechanical Engineering, IFET College of Engineering, 
\textsuperscript{1}Student, Department of Mechanical Engineering, IFET College of Engineering, Villupuram, 
Tamil Nadu, India. 
E-mail address: arunarunachalamjothi@gmail.com

Abstract: Agriculture is the backbone of our country India and it can be play a major role in our India economy. In India, rice is the major resource and important for all the human beings but farmers are facing more difficulties in paddy cultivation. There are two types of rice transplanting one is manual or hand cultivation and another one is cultivation through machine. Discharging of work power to segments other than Agriculture is imperative to build up the nation. To discharge the work power in paddy area, automation assumes a major role. At time of manual paddy cultivation farmers are facing various problems such as back bone pain, salary for workers, etc. So this problem can be overcome by intervention of machine rather than manual cultivation but machines have complex design and high cos. This research suggests a simple design by reducing the cost of the machine and the holder can make the work more effective.

1. INTRODUCTION

Transplanting rice is perhaps the most clarified system where seeds are planted in one spot and after the seedlings are grown a little amount they are relocated to other wide spread locale. This is improved return and less amount of weeding. Presently day's ranchers in our nation are quick to utilize new strategies just as new advancements in the field of agribusiness. Thus in this paper fundamental spotlight is on Rice transplanting machine which could give a gigantic lift to the horticulture area particularly in the field of rice development. A rice transplanting machine is specific hardware best fitted to transplant rice seedlings on the wet sloppy paddy field.

The mechanical transplanting of the rice has been viewed as the most encouraging alternative, as it spares work costs, guarantee convenient transplanting and accomplishes ideal plant thickness that add to high efficiency. In India, advancement and spread of rice planting advanced quickly during 1990 and 2000. According to the most recent innovative patterns and progressions in agrarian segment such motorization of paddy planting machine will address the difficulties and will conquer the issues related, so the development of paddy is consistent and will is going to fulfill the future needs with ceaseless gracefully of characterized volume.

2. PROPOSED METHOD

In this, transplanter can be moved by man power through hand. These machines are less in weight and small in size, so it can be operates easily by man.

3. MECHANISMS

In these they are two types of mechanisms are used

- Four bar Mechanism and
- Cam Spring Mechanism.

3.1 Four bar Mechanism
Length of crank = 3.5 cm
Length of lever = 6 cm
Length of connecting rod = 10 cm
Length of fixed frame = 8 cm

Grashof Condition

\[ S + L \leq P + Q \]
\[ 3.5 + 10 \leq 6 + 8 \]
\[ 13.5 \leq 14 \]

Hence Grashof’s law is satisfied.

3.2 Calculation of Speed of Rotation

\( Z_1 \) – Teeth in sprocket 1
\( Z_2 \) – Teeth in sprocket 2
\( N_1 \) – Speed of Rotation of Pinion 1
\( N_2 \) – Speed of Rotation of Pinion 2

Speed of Rotation of Pinion \( N_2 = 25 \) rpm (Optimum Value)

Teeth in Sprocket \( Z_1 = 18 \) teeth
Teeth in Sprocket \( Z_2 = 18 \) teeth

Transmission Ratio:

\[ \frac{N_1}{N_2} = \frac{Z_1}{Z_2} \]
\[ N_1 / 25 = 18 / 18 \]
\[ N_1 = 25 \text{ rpm.} \]

4. COMPONENTS DESIGN

4.1 Freewheel

The primary capacity of free wheel is to send force through chain. There are two freewheel-one drivers and other driven mounted on separate shafts. And totally three free wheel at 18 teeth is used.

4.2 Planting Finger

This is the planting finger or holder. In this planting finger they are done a two type of work they are hold the paddy and plant the paddy without any losses. In this planting finger plant the paddy in 90 degree.

4.3 Chain

Chain can be used to transmitting the motion. In this they are two chain drives are used and it can be transfer power from one freewheel to another freewheel.

Length of chain
\[ L = L_p \cdot P_d \]
\[ L_p = \text{Length of continues chain in multiples of pitches.} \]
\[ P_d = \text{Pitch diameter.} \]
\[ a = (100-50) \cdot P_d \]

where \( a \) is the centre of distance

\[ a = 100 \text{ cm} \]
\[ 100 = (100-50) \cdot P_d \]
\[ P_d = 100/50 \]
\[ P_d = 2.2 \text{ cm}. \]

Now to find length \( L_p \)

\[ L_p = 2a_p + (Z_1+Z_2)/2 + ((Z_1+Z_2)/(2\cdot3.14))^2 \cdot a_p \]

Where \( a_p \) is the approx. centre distance in multiplies of pitches

\[ a_p = a / P_d = 110/2.2 = 50 \text{ cm}. \]

\[ L_p = 2(50) + (58)/2 + ((58)/(2\cdot3.14))^2 / 50 = 32.71 \text{ cm}. \]

Length of chain \( L = L_p \cdot P_d = 32.71 \cdot 2.2 \)

Length of first chain = 72 cm.

Length of second chain = 23 cm.

4.4 Tray

A level, rectangular compartment comprised of sheet metal, ordinarily with marginally raised edges, utilized for conveying, holding, or showing articles of rice seeds. In this tray can be present 60 degree because sliding of seeds. They are two vertical tray can be present.

Sheet metal length = 45 cm.

Sheet metal breadth = 19.5 cm

4.5 SHAFT

A drive shaft is a mechanical part for transmitting power and transformation, typically used to interface other portion of drive chain that can't be related direct because of expel or the need to consider relative improvement between them. A drive shaft is a mechanical section for transmitting power and turn, typically used to relate other portion of drive chain that can't be related genuinely because of partition or the need to consider relative advancement between them.

Shaft length = 30 cm.

Shaft diameter = 2 cm.

5. WORKING
The motion of the machine can be backward direction. Through the backward direction, the handle also can be rotates backward. They are two handles in that one handle is fixed and another handle can be rotates. Through the handle rotation the power is transferred from one shaft to another shaft by chain drive. The chains are interconnected with freewheels. They are three freewheels are been used and two chains are been used. The first chain drive is used to taking the seeds from tray by planting finger. And the planting finger is working by Cam Spring Mechanism. The second chain is used to transfer the seed from planting finger to planting arm and planting arm to soil.

![Efficiency Graph](image_url)

**About Graph**

- The efficiency can be denoted by wastages of crops in machine.
- High efficiency is denoted by low wastages of crops.
- Low efficiency is denoted by High wastages of crops.

### 6. ADVANTAGES

- Simple design.
- There is an no need of the labors and also no need of labors cost.
- Easy to repair by farmers it and maintenance is less.
- Reduce the Human effort.
- Cost will reduced from Rs.18000 to Rs.7000.

### 7. LIMITATIONS

- Transplanter cannot be operates continuously.
- Healthy person can operate the transplanter.

### 8. IN FUTURE
The project in future can go over numerous progressions like a programmed or self-loader framework with sun oriented board and engine which runs at consistent speed appended to shaft as opposed to giving force by hand.

9. RESULT AND CONCLUSIONS

In normal days, farmers are facing difficulty with paddy cultivation using the conventional methods. Later mechanical Rice transplanters were introduced by Japanese in 1960. Wastages of crops, machine cost high and complex design are the major difficulties faced by using those machines. Those difficulties are overcome by our Mechanical Rice transplanter that is made up of cam spring Mechanism. Compare to other transplanters, our transplanter holder can be used by there is no loss of seeds and rice can be planted in 90 degree. It is made up of simple design, if any problems can be occurred, it can be repaired by farmers and cost also less. In future our machine can be converts into the semi automatic and automatic transplanter, when addition, adding the solar panels and motors in the transplanter.

![Figure 2: Mini Paddy Transplanted (Proposed Model)](Image)

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