

# Automated Rice Plantation Machine

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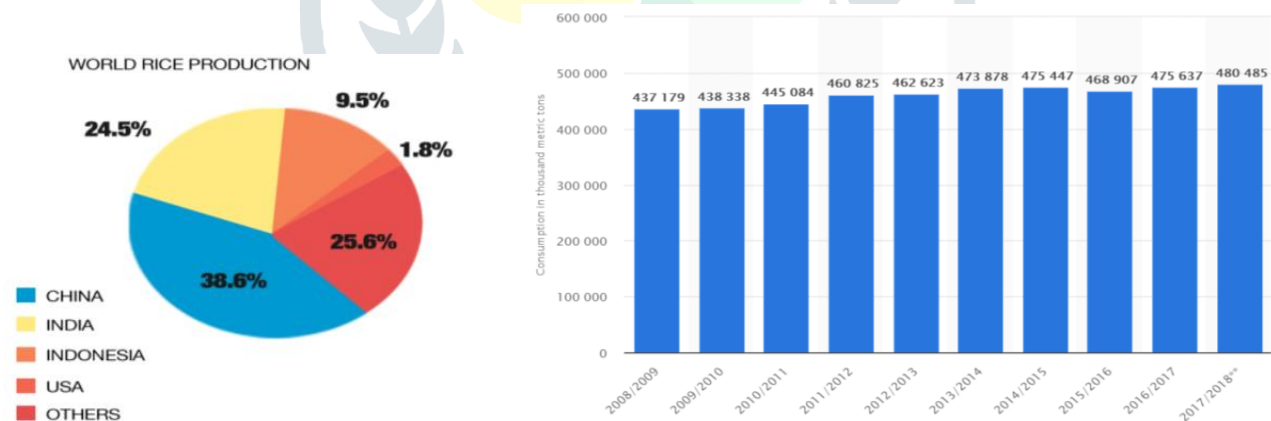
**Abstract :** The most important sector for Indian Economy is agriculture sector. Majority of the employment in India is in the agriculture sector. Labour intensive and drudgery are the orthodox way of rice plantation. Mechanized rice plantation machine is cost-effective & operation friendly. For mechanical plantation machine, well puddled and levelled field is required with no standing water on the surface because it creates more floating hills. Considering the growing population, it is a huge challenge to suffice the entire population. Mechanization in paddy sector will have higher yield and it will release most of the work force to other sectors. The aim of this project is to design a mechanized rice plantation machine to plant rice saplings. Use of high intensive cropping, proper time of operations is one of the major parameters to achieve using this machine. The two row paddy rice plantation machine is quick way of sowing the sapling as well as proper spacing between successive saplings can be maintained. Labour required for operating machine is reduced, due to which labour cost is reduced.

**Keywords:** agriculture, paddy field, mechanization.

## I. Introduction:

Rice is mainly produced and consumed in the Asian region. India has the largest area under paddy in the world and ranks first in the production of rice. Average rice production per hectare in India is 2.2 tonnes. Climatic condition such as temperature and humidity plays a vital role in rice production. (i) Pre-Planting (ii) Post-production (iii) Growth, these are the steps used in the production of rice. The seven sister region of India covers 7-8% of the total region of rice cultured in India and in terms of rice produced, accounts to only 5-6% of the total national rice production. However, this region is delayed in terms of rice produced because of lack of work force.

(i) age of the variety (ii) availability of moisture (iii) climatic conditions (iv) Availability of inputs and labour are the factors responsible for cultivation. Availability of inputs and labour is an important criteria. Several attempts has been made to mechanize operation, research is under progress to reduce the production cost with less working load there by reducing stress. Machine needs chronic bending down and straighten up for transplanting process on the other hand mechanical machine requires energy to tug the sapling inside the field. Because of costlier automated machine, it is unfeasible for a farmer to buy a non-subsidized automated paddy plantation machine.



## II. Objectives:

- 1) Perfect vertical positioning of sapling when placed inside the soil.
- 2) As it is manually operated machine, experienced workers are not required.
- 3) Planting seeding evenly without damaging them.
- 4) Easily transportable and cost effective.
- 5) Reduce labour charges and the man power requirement.
- 6) Prevents backache problem of farmers.
- 7) Satisfactory working of machine on different soil conditions.

### III. Literature Survey:

**Murumkar R.P, MuthamilselvanM,RajibBhowmik[1]**, in their paper stated that Rice being the important crop cover about one fourth of the total cropped area and cater food to half of the Indian population. In this paper they carried an experiment on performance testing of four row self-propelled paddy transplanter and it was seen that the machine per hectare saved 30 days of labor. They also tried to develop 6-row and 8-row paddy transplanter machine with 25 Hp tractor and observed that transplanting quality is not up to the mark due to depression caused by wheels. Hence they decided to develop two row machine for small farmers and found that time saved was 91% compared to hand transplanting.

**Dixit, R Khurana, JaskarnSingh[3]**, this paper discussed about characteristics of mat type methods of raising paddy saplings, Economics of raising mat type saplings by different methods with the help of table as well as methods of preparation of sapling mats. They also stated advantages and disadvantages of Manual Transplanting of Paddy followed by the discussion of development of paddy transplanter. Moving further they gave the classification of paddy transplanter based on power source based on the development i.e. Manually operated ,Self-propelled walk behind type ,Self-propelled riding type, Tractor operated Manually operated, Self-propelled walk behind type, Selfpropelled riding type, Tractor operated. They discussed about parameter affecting the performance of paddy transplanter as well as machine parameters. Lastly they gave list of results in table form followed by conclusions.

### IV. Design:

#### A. Terminologies Used:

##### 1. Roller Chain:

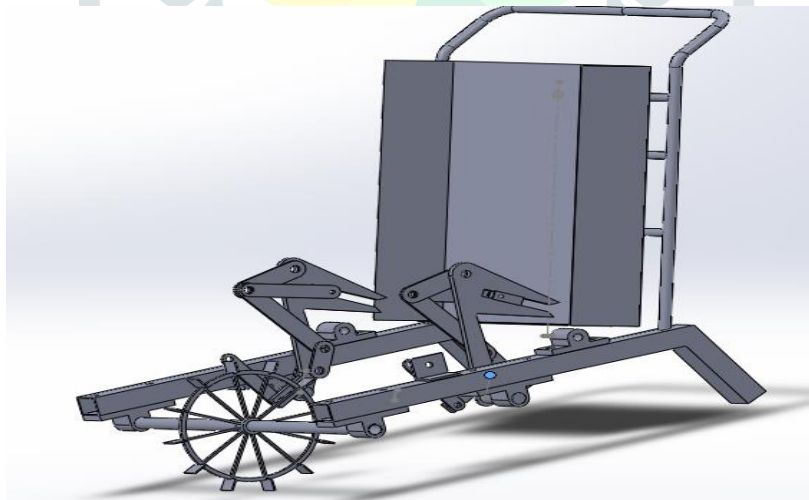
A roller chain is used for emanation of mechanical power from driving to driven components. Roller chains are widely used in automotive sectors. A roller chain consists of cylindrical rollers held together with other cylindrical rollers with the help of side links. A roller chain is driven by sprocket, which is also called toothed wheel. In this machine we will use chain to transmit rotary motion from hand lever to Picker Arm and Plantation arm.

##### 2. Picker-arm mechanism:

A Picker arm assembly is fixed on the shaft with sprocket, which will get the rotary motion from the chain. The saplings are arranged on supporting plate and the picker arm picks up the sapling one by one and once the sapling is taken, the sapling above the lower sapling takes place of previous one. And the process continues until the shaft rotates.

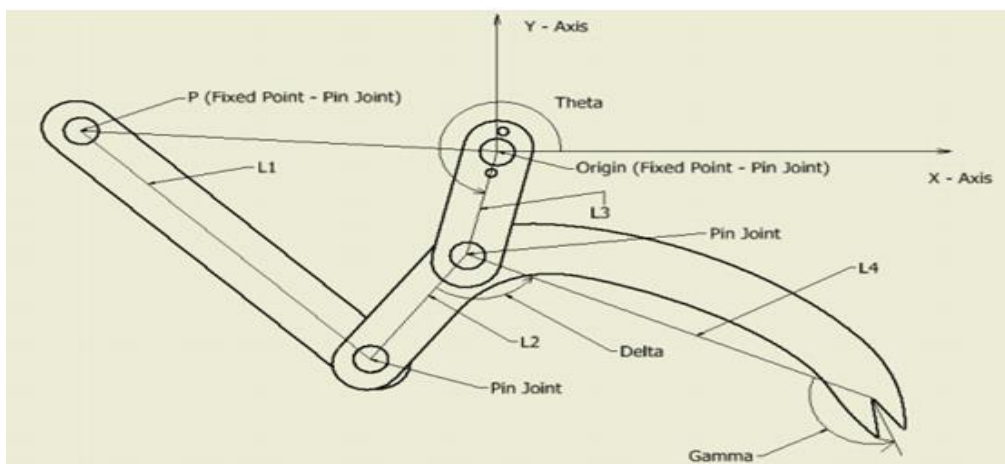
##### 3. Planting arm mechanism:

A planting arm assembly is mounted with the help of supporting frames on the base plate. The mechanism is such that the motion of assembly will collect the sapling from the picker arm and will plant the sapling into the soil. This assembly is also fixed on shaft with sprocket.



**Fig. CAD-Model of two row rice plantation machine.**

**B. Design of picker arm mechanism:** Grubler's criterion is concerned with the number of links in the mechanism. Kinematic pairs can be used to determine degree of freedom of a mechanism. Four-bar linkage should satisfy Grashof criterion, based on the link lengths. Newton-Raphson method is used to solve non-linear equations for solving the four-bar linkage positioning problem.



## V. Expected Outcomes:

- 1) Farmers can plant the rice saplings in very less time using this machine compared to the manual transplanting process.
- 2) It will reduce the requirement of the labour.
- 3) This machine will reduce the back ache problem for farmers.
- 4) The saplings can be planted evenly without damaging them.
- 5) Sapling plantation will be done in a specific manner.



## VI. Future scope:

If successfully implemented, system can be developed further to:

- 1) This machine can be fully automated using engine which can again reduce the efforts for plantation.
- 2) The number of rows of plantation at a time can be increased with the increase in number of picker arm and planting arm assembly.
- 3) Machine could be advanced to plant several rows concurrently.

## VII. Conclusion:

- 1) This machine will help in increasing Productivity of the rice.
- 2) The rice sapling plantation machine will work satisfactorily to solve various problems of farmers.
- 3) Automated rice plantation machine, the device is independent of tractor so it is suitable for poor farmer. It saves the time as well as labor cost.

## VIII. Acknowledgement:

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