

## Paddy Transplanter Machine

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**Abstract:** India is an agrarian country. About 70% of Indians are dependent on agriculture for their livelihood. India is one of the world's largest producers of rice, accounting for 20% of all world rice production. Rice is usually grown by planting rice paddy in the fields manually with hands. With this method of 'planting rice paddy, labour cost increases and it is a very time consuming process. These problems can be solved with the help of rice planting machine. This machine reduces labour cost and time to plant rice paddy. This machine has a simple mechanism and it is eco-friendly. This machine requires only one person for its operation. This machine can bring revolution in rice production. So, the main aim of this to design and develop a rice planting machine which will help the farmers to make the whole rice planting process mechanical resulting in reduction of labour, cost and time to a large extent

**Keywords:** Paddy, Transplanter, Plant catching mechanism, Chain drive

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### 1. Introduction

Majority of farmers in developing countries are poor and avoid taking risk in adopting new technology until they are sure about its benefits. In the time where technology is merging with environmental awareness, consumers are looking for ways to contribute to the relief of their own carbon footprints. Pollution is manmade and can be seen in our own daily lives, more specifically in our own homes.

The era of modernization is viewed in the entire sectors especially in the agriculture sector. Gone are the days when farmers meant a poor man laboring hard to meet his needs. In the modern times, farmers are equipped with agriculture technology that is latest and trouble free. With the entry and increasing influence of the science in the traditional farming, the agriculture industry of the nation is celebrating green revolution each moment. The new technologies have helped in utilizing even the small land into loads of profit making source. Farmers whether small or big are getting more and more aware of the fact that technology is very beneficial to them and the future of the agriculture industry.

### 2. Literature Review

A study is made in mechanized rice transplanters in the field of rice cultivation are been discussed by studying various parameters related to transplanter and its field performance in the recent years. Transplanting essentially refers to the planting of 20-35 days old and 20-30 cm high seedlings rose in nurseries and uprooted for transplanting either manually or mechanically. In India rice is mainly cultivated during the Kharif session. In traditional transplantation of rice in the paddy field mostly female workers are indulged. Mehta et al [1] conducted an experiment by selecting fifteen female subjects of different age. They used 4 row, 3 row and 2 row rice transplanter on the basis of their study of various parameters they concluded that the 3 row rice transplanter was the best among all transplanting method

Similarly, Rajvir Yadav et al. [2] had conducted an ergonomic evaluation of six row manually operated rice transplanter. Under their study the field capacity of transplanter was more than as compared to traditional method and average force required for pulling the transplanter was considered to be 130.32 N for male and 145.12 N for female subjects. Martin and Chaffin , Ayoub and McDaniel , and Chaffin et al. found that heights at which push-pull forces are applied are the most important variable which hugely affects the force output. In 1985 G.Singh et al. [3] conducted study at the IRRI farm on a mechanized manual rice transplanter and reported that at this farm the transplanter performed well with field capacity of 0.034ha/h under various water depths with different aged seedlings.

A.K. Goel et al. [4] conducted an experiment on three transplanters namely OUAT, CRRRI and Yanji rice transplanter. Here they concluded that in accordance with the split plot design of experiments 32 hours of sedimentation period was suitable for operation of manual transplanter while the same was 56 hours for Yanji

transplanter. The SRI (System of Rice Intensification) transplanting method encourages the planting of one seedling per hill and spaced in 25×25 cm for better usage of water, nutrient and pest management [5]

### 3. Methodology

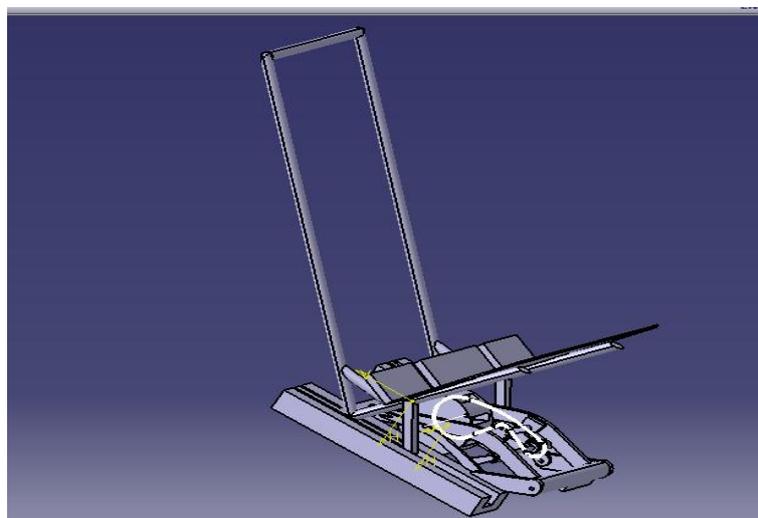
**Selection of Area of research** Farmers are not aware of the advantages associated with transplanting of paddy over the broadcasting. But they are unable to practice it for high scarcity of labor. Still the transplanting machines available for the country are imported. Engine driven transplanters are high in cost and the inter-row, intra-row spacing are fixed which are not suitable for the Indian condition. Existing manually operated transplanters are inefficient. The main reason for the poor acceptance was the low capacity of the machine. A simple engine operated transplanter or manually operated transplanter having an average capacity of one hectare per day would be a better solution.

**Method establishments:** Two methods practiced in establishment of paddy in India. Those are direct sowing / seeding and Transplanting. 1 Direct sowing / seeding there are two types- Wet seeding & dry seeding. Wet seeding Pre germinated seeds are used to broad-casted into puddled as well as leveled fields which are free from standing water. At same time of puddling basal fertilizer must be added in it. Spraying should be done when seedlings will come up to 10 inches long. The stand establishment by this method varies with the quality of land preparation, weed competition, water management & rain water during the first period after sowing. Dry seeding untermated dry seeds are sown into dry mud in orientation as per requirement. Rate of seed varies with the conditions & the type of physical damages & impurities of the seeds. Rate of seed varies from 145Kg/ha to 290Kg/ha depending on the level of weed infestation in dry seeded rice. Well development of plant, No transplanting shock to the plant, Suitable method for short duration varieties.

### 4. D Model of the machine

The following diagram shows the final 3D model of our paddy planting machine. First of all, the stainless steel hollow pipes are welded together with the help of electric arc welding. Because, in arc welding, the temperature attained is high. After the frame is completed, the motor is mounted and along with that, worm is attached at the output shaft of motor. Then, the worm wheel is aligned with the worm and it is also fixed. Then, we have to fit the bearings and sprockets in the shaft by tight fit using Hydraulic Press. Then the chains and blades has to be fixed.

Then this assembly have to be fitted into the main frame with the help of bearings. The middle bearings have to be welded with the frame so that the shaft will be more rigid while it runs. Finally, the handle will be joined with the frame. Now this attachment is ready for pulling the plants after joining it with the power tiller output shaft. We used four bar link mechanism so that the cost of the equipment will get reduced.



### 5. Result

Prototype mechanism was evaluated in the field, and it worked. There were some points to be redesigned. Tray mechanism worked but the design should be altered or improved. The tray move to both left and right directions while the tray on a groove. That resulted high friction. Therefore it is better to have nylon bushes and iron or aluminum rods to reduce the friction. Tray moving mechanism made using nylon sprocket

wheel. As the tension is high in that chain the nylon sprocket get damaged easily. It's better to use iron sprocket with same diameter and number of teeth to reduce the damage when tension is high. The sprocket and chain used for the machine was foot cycle chains and sprockets. When machine is operated the sprockets get damaged by bending the teeth. So it is better to have motorcycle chains and sprockets to power transmission. But that will result an increase in weight. Therefore, instead of chain and sprocket speed reducing mechanism, a gear system should be used.

### References

- [1]. S. Pradhan and S.K. Mohanty (2014), Ergo Economical Analysis of Different Paddy Transplanting Operations in Eastern India, IOSR Journal of Agriculture and Veterinary Science ,Volume 6, 23-2
- [2]. RajvirYadav, Mital Patel, S.P. Shukla and S. Pund (2007), Ergonomic evaluation of manually operated six-row paddy transplanter, International Agricultural Engineering Journal , 16(3-4),147-157.
- [3]. G. Singh, T. R. Sharma, C.W. Bockhop (1985), Field Performance Evaluation of a Manual Rice Transplanter, Journal of agricultural Engineering Research,32, 259268.
- [4]. A.K. Goel, D. Behera and S. Swain (2008), Effect of Sedimentation Period on Performance of Rice Transplanter, Agricultural Engineering International: the CIGR Ejournal,Vol. X., Manuscript PM 07034.
- [5]. Bala Ibrahim and Wan Ishak Wan Ismail (2014), Development of System Rice Intensification (SRI) Paddy Transplanter, Asian Journal of Agricultural Sciences, 6(2), 48-5

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