

# Development of Rice Planting Machine

## Review Paper

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**Abstract**—Agriculture is the major sector contributing to the Indian economy. Growth in this field will bring the remarkable change in Indian economy. Also rice is the most staple food of many countries. Traditional method of rice planting is very tedious job, with lot of human efforts. So there is a need of mechanizing this process in a affordable cost. This review paper is based on how we can reduce the human efforts and plant the rice seedling efficiently using human operated Rice Planting Machine.

**Keywords**— *Rice Planter, Linkage Mechanism, Power Transmission, pick and placing arm*

### I. INTRODUCTION

Agriculture is the most important sector in Indian economy. Almost most of the Indians source of income is agriculture. Also rice is the stable food in most of the countries. The annual production of rice is increasing every year. Also the population is increasing. There is need to increase the production of rice. But the manual process of production of rice is very tedious job. Farmers face lots of problems like health issues (Back problems, skin infection, high labour cost, loss of time etc.). Besides this if we transfer labour required in this field to some other field, it will help in increasing Indian economy. In order to reduce all such problems it is very important to mechanize the rice planting process which will give the higher yield of rice in short period, less human efforts, in low cost which will be affordable to all small scale farmers in all over world.

Transplanting is one of the major process for establishment of rice 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. Seedlings 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 transplantation the cost of production of rice also increases. With the help of a Rice Transplanting Machine, the transplantation cost as well as time will decrease with increase in efficiency.

### II. LITERATURE REVIEW

Detail Literature Review as Follows:

Uttam Kumar and E V Thomas presented “Determination of Force Acting on Rice Transplanter Finger” from this paper we understood that the forces acting on a fixed fork type transplanting finger during separation of rice seedlings, a laboratory model transplanter was developed. It was equipped with transducers to measure the forces and to measure the speed of rotation of the crank that give motion to the finger. The nursery seed rate was varied from 0.35 to 1.15 kg/m<sup>2</sup>. Planting velocity varied from 0.29 to 0.55 m/s. Average tangential force on the finger had minimum and maximum magnitudes of 3.68 N and 4.70 N, respectively for 15 mm mat and 3.10 N and 5.32 N, respectively for 20 mm mat. However, one millisecond peak value of the resultant forces had a maximum value of 28.3 N and 29.7 N for 15 mm and 20 mm mats respectively. These values can be used for calculating the magnitude of deflection during the design of the transplanting finger. [2]

Dushyant Kalchuri (M.Tech Production Engineering Student) and Prof. P.N. Shende (Assistant professor, Department of Mechanical Engineering) presented “An Overview on Rice Transplanting Machine” from this we concluded that rice is one of the staple food crop of our country. Basically in India establishment of rice depends on the availability of moisture, climatic condition, age of the variety, availability of inputs & human labour. Amongst these

dependencies availability of inputs & human labour play a huge role on deciding the method of establishment of rice. Shortage of labour and labour costing is one of the major issues of concern now days as it leads to failure of scheduled transplanting of rice. Hence to overcome these issues there is a need of mechanization in the field of rice cultivation by using rice transplanter as major tool in this process.[1]

Anoop Dixit, R Khurana, Jaskarn Singh, and gurusahib Singh presented "Comparative performance of different Paddy transplanters developed in India" from this we understood that in the transplanting method, seedlings are first raised in a seedbed in the nursery and uprooted for transplanting either manually or mechanically. The transplanters are classified on the basis of nursery used i.e. Machine using wash root seedling and machine using mat type seedlings. Mat type seedlings are raised on a polythene sheet with the help of frames.[6]

S. Pradhan and S. K. Mohanty presented "Ergonomic analysis of different Paddy Transplanting operations in eastern India" from this paper we got the information that transplanting of paddy is very tedious job mostly done by female workers during kharif season and by 2020 there would be 50 % women against 42 % at present. Manual hand transplanting consumes a lot of energy and time and full of fatigue, but the poor socio-economic condition of the farmers does not allow them to adopt power operated transplanter. Transplanting operation by different research centers have been developed as 2 row, 3 row, 4 row rice transplanter. Keeping this in view fifteen female subjects were selected in the age group 18-45 years in the central farm of OUAT. The mean value of age, weight, height, VO<sub>2</sub> max and Body surface area were found to be 31.1 years, 51.7 Kg, 153 cm, 1.71 l/min and 1.52 m<sup>2</sup>. Physiological parameters like Heart rate, Oxygen consumption rate and Relative cost of workload were measured in different transplanting operations.[3]

Bala Ibrahim and Wan Ishak Ismail presented "Development of system Rice Intensification (SRI) Paddy transplanter" from this paper we understood that SRI practices have been developed in order to increase production and quality of rice. Based on SRI practices the rice seedlings are transplanted at the young ages, fifteen days old with just 2 leaves and carefully planting of just one seedling per hill and space the hill optimally widely in a square pattern of 25x25 cm for better usages of water, sunlight, minerals, space, nutrient, weeding and pest management within in the moist soil condition. [4]

Baldev Raj Kamboj, Dharam Bir Yadav, Narendar Kumar Goel, Gurjeet Gill, Ram K. Malik, Bhagirath Singh Chauhan presented "Mechanized Transplanting of Rice in Non puddled and No-Till Conditions in the Rice-Wheat Cropping System in Haryana, India" from this paper we understood that the common practice of establishing rice in the rice-wheat system in India is manual transplanting of seedlings in the puddled soil. Besides being costly, cumbersome, and time consuming,

puddling results in degradation of soil and the formation of a hard pan, which impedes root growth of subsequent upland crops. In addition, decreased availability and increasing cost of labor have increased the cost of rice cultivation through conventional methods. Because of these concerns, there is a need for mechanized transplanting of rice which is less labor-intensive and can ensure optimum plant population under non puddle and/or no-till conditions. [5]

## CONCLUSION

As we studied the manually operated rice transplanter with simple mechanism and low maintenance which is affordable for every farmers. From this Review, we try to reduce cost of this machine which is most important as same machine is available in number of countries in the world but cost of the machine keep away farmers from its benefits. And also increase the production of rice efficiently. Hence we are going to use simple Linkage mechanism which reduces the farmer efforts and it is easy to handle

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