A Review of Literature on Rice Transplanter Technique

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Abstract- *Agriculture is the most important sector of India and plays a significant role in the overall economy of the country. Rice is the major staple food of the country of about 65% consumption in grains. It is the major source of employment in the country. With the increasing population, consumption of food is also increasing. To cater the ever growing demand of the population is a big challenge. The common practice of rice cultivation is manual transplanting of seedlings. Besides being costly, cumbersome, time consuming, it is very labour intensive task. Hence there is a need to develop such a mechanism which would provide a faster rate of transplantation as compared with the existing. The basic aim of this study is to design a more productive system at at low costrice seedling transplanter for small scale former in rural India.*

Keywords- Rice Cultivation; Seedling; Transplanter; Design mechanism.

I. INTRODUCTION

Agriculture has been the backbone of the Indian economy and it will continue to remain so for a long time. Agricultural sector is changing the socio-economic environment of the population due to liberalization and globalization. About 75% people are living in the rural area and are still dependent on agriculture. About 43% of geographical area is used for agricultural activity. As Indian population is growing continuously, the demand for producing crop per hector is also increasing, this requires efficient and high-capacity machines. So mechanization in agricultural industry plays an important role in Indian economy. Rice being the important food crop covers about one fourth of the total cropped area and cater food to half of the Indian population. In India, average rice production per hectare is 2.2 tone [1]. Climatic condition such as temperature and humidity plays a vital role in rice production. North Eastern India is considered to be potential region for rice production. North Eastern India covers 7.8 percent of the total area of rice cultivated in India and in terms of rice production, accounts to only 5.9 percent of the total national rice production. However, this region is lagging in terms of rice production because of labour intensive work. Rice cultivation mainly depends on the following factor (i) age of the variety(ii)availability of moisture (iii) climatic conditions (iv) availability of inputs and labour. Among these reasons, availability of inputs and labour play a huge role on deciding the method of production of rice. Several attempts have been made to mechanize rice transplanting operation by introducing various transplanters and research is under progress to reduce the cost of production with less fatigue. Local transplanting requires frequent bending down and straighten up for transplanting process whereas mechanical transplanter requires energy for pulling the transplanter in puddled field. Due to the high price of an automated paddy transplanter, it becomes costly for a small scale farmer to buy a nonsubsidized automated rice transplanter. An attempt has been made to fabricate a manual operated rice transplanter which is effective as well as cheap. Murumkar R. P. et al. [2] during an experiment on performance testing of a four row self-propelled paddy transplanter, observed that the machine saved 30 man days of labourperhectare.

II. LITERATURE REVIEW

Rajib Bhowmik

The working of the paddy transplanter is found to be satisfactory. The selection of four bar mechanism turns out to be effective and simple to fabricate. The cost of fabricating the paddy transplanter is way cheaper than that of an automated paddy transplanter. It is seen that by using a two row paddy transplanter 0.04 ha/day can be transplanted while on the other hand manual transplanting can achieve only 0.2 ha/day, considering 8 working hours a day. The estimated cost of paddy transplanter is Rs 7000 and it is easy to operate. [1]

R.P. Murumkar, U.R. Dongarwar, D.S. Phad, B.Y. Borkar and P.S. Pisalkar

Paddy transplanting was done using self propelled four row paddy transplanter. Based on the field testing conducted during kharif 2010-11, 2011-12, The working performance of the self propelled four row paddy transplanter was found to be satisfactory. The labour requirement was found to be 2 man days per hectare compared to 32 man days of labour per hectare in manual transplanting of paddy. Thus, it saved 30 man days of labour per hactare. [2]

P.B. Gaikwad, P.U. Shahare, S.V. Pathak and V.V. Aware

The four row self-propelled paddy transplanter was developed and fabricated in workshop of Department of Farm Machinery and Power Dr. BalasahebSawant Konkan KrishiVidyapeeth, DapoliThetransplanter was tested in laboratory as well as on the field. Laboratory test results showed that transplanting mechanism and feeding mechanism functions properly. Constant row spacing of 23.8 cm was maintained. No break downs were observed during laboratory test. [3]

S. Pradhan and S.K. Mohanty

The annual fixed cost and variable costs were calculated by depreciation method by taking the purchase cost, annual uses of transplanter and life of machine. The daily wage of workers was taken to be Rs.150 with ten minutes break in every half an hour. The cost of operation per hectare were found to be Rs.2550 for local practice where as Rs.2484 for 2 row transplanter, Rs.2346 for 3 row transplanter and Rs.2237 for 4 row paddy transplanter. It was observed that while transplanting manually in bending posture the average area transplanted is 0.03 ha/day. But maximum 0.10 ha/day in case of 4 row paddy transplanter followed by 0.08 ha/day in 3 row and 0.065 ha/day in case of 2 row paddy transplanter. [4]

Bala Ibrahim and Wan Ishak Wan Ismail

The System of Rice Intensification (SRI) practices have been developed in order to increase the production and quality of rice. The existing method of mechanical transplanting of paddy which planted between 5 and 8 seedlings per stand is claimed to be inefficient to produce higher yield. From the survey that was carried out, most farmers are looking forward to single-planting translators as it is impossible to do it manually. Modifications have to be carried out on the planting claw so that it will only catch one seedling at a time, redesign the seedling tray to allow the SRI transplanter to catch one seedling at a time and determine the best soil condition suitable for the SRI practices.[5]

M. V. Manjunatha, B. G. Masthana Reddy, S. D. Shashidhar and V. R. Joshi

Mechanical transplanting requires a special method of raising seedlings called Dapog or mat type seedlings. Raised beds of 10 m length, 1.2 m width and 2.5 cm height were prepared and covered with polythene sheet of 1.2 m width and 50 micron thickness. Soil was sieved and mixed with equal quantity of farm yard manure and spread over the polythene sheet to a depth of 2 cm. Sprouted seeds were spread uniformly on the polythene sheet and pressed gently. They were covered with paddy straw and watered through rose cans for four days. After the fourth day paddy straw was removed and seedlings were grown normally by regular watering. [6]

III. OVERVIEW

Due to severe weed problem and grazing in lean season the farmers prefer transplanting than direct sowing of seeds. It is a labour intensive operation which requires 200-250 man-h/ha. During peak season labourers are not available. In India manual transplanting of 25-30 days old root washed seedlings are done, where as in China, Japan and Korea mechanical rice planters are used with mat type nursery seedlings. The mat type seedlings are raised with 20-25 cm thick well sieved soil layer mixed with farm yard manure or organic manure placed in trays or over polythene sheets. Transplanters using root washed seedlings are not available. The farmers are not trained in mat type nursery raising and operation of transplanter. The output of manual transplanter is less.

IV. SCOPE OF THE PROBLEM

The rice transplanter is design and fabricated using locally available materials in order to reduce the cost. The purpose of fabricating the ricetransplanter is to minimise the manufacturing cost that can be used by small scale farmers. Rice transplanter is used to increase the speed of the transplanting operation and also proper placement of rice seedlings in rows. The labour requirement was found to be 2 man days per hectare compared to 32 man days of labour per hectare in manual transplanting of rice seedling. Thus, it saved 30 man days of labour per hactare.A single-planting translator as it is impossible to do it manually but by transplanter it will be possible to only catch one seedling at a time.

V. ADVANTAGES OF RICE TRANSPLANTER

- The rice transplanter can transplant more than 0.2-0.4 hectare field per hour.
- Time saving and labor saving. The rice transplanter machine can transplant the seedling quickly and with less than two people.
- The machine is with compact structure and small volume can operate in the field easily.
- Machine transplanting involves planting young rice seedlings into puddled soil by machine.
- Reduces stress and health risks.
- Ensures uniform spacing and plant density.
- Seedlings recover fast and mature uniformly

VI. CONCLUSION

The shifting of manual transplanting to mechanical transplanting or direct seeding with a reorganization of land and labour resources have brought higher levels of farm productivity and income. The existing method of mechanical transplanting of paddy is claimed to be inefficient to produce higher yield. From the survey that was carried out, most farmers are looking forward to single-planting transplanters as it is impossible to do it manually. So,we are designing a multi-row rice transplanting machine which will catch one seedling at a time during its operation. The main task now is to promote this technology and have available to farmers at an affordable price. No doubt that the new develop transplanter will be the future machines for the farmers in India.

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