International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 06 Issue: 02 | Feb - 2022 ISSN: 2582-3930

REVIEW PAPER ON DESIGN & MANUFACTURING OF RICE TRANSPLANTING MACHINE

Prof . S.V. Vanjari, Harshvardhan Mestri, Zaid Shaikh, Kashinath Parab, Pandurang Bagve

Department of Mechanical Engineering ,S.S.P.M's college of Engineering ,Kankavli ,India.

----------****----------

Abstract – The aim of our project is to manufacture a rice sowing the rice seed to rice transplanting from one place to other place to the cultivation of rise to the harvesting of rise and lastly to collection of rice was done only by manually. Rice is one of the moisture, climate condition, age of variety, availability of input and human labour. By using rise transplanting machine we can overcome to some extend. There is also need for designing an economical and user friendly rice transplanting machine for small scale farmers in order to increase the production as well as quality of rice. For mechanization the modelling and simulation evaluated for hand operated rice seeding machine, which will help farmer to plant more and more amount of rice. The purpose of paper to design rice transplating machine which will help the small scale farmers to reduce the production cost so that they can get maximum profit on production.

Keywords – rice transplanter, small scale farmers, cost minimization, higher productivity

I. INTRODUCTION

India is known to be an farming country. About 71% of the population of India is dependent on farming direct or indirect manner. The farmers are using the same methods and apparatus since ages. As the time changes and things required to change as well in order to advance the techniques and equipment's .So, that productivity of farming increases. Agriculture also plays a important role in economy of India. Its contribution in the GDP is now extend one sixth of the total. The Indian Government has also in progress taking steps in the form many initiatives in which the farmers are made aware about the different farming techniques. There are basically five steps that a farmer needs to do correctly to get increased output. These five steps are as follows: .Ploughing, Seed Sowing, Irrigation Process, Harvesting ,. Threshing .As we know
that the rice is one of the primary food of the India. [5]

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 paddy 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 where as mechanical transplanter requires energy for pulling the transplanter in puddled field. Due to the high price of an automated paddy transplanter, it becomes impossible for a small scale farmer to buy a non-subsidized automated paddy transplanter. An attempt has been made to fabricate a manual operated paddy transplanter which is effective as well as cheap.

II. LITERATURE REVIEW

S. Pradhan and S.K. Mohanty presented,Transplanting of paddy is very tedious job mostly done by female workers during Kharif season and by 2020 there would be 50 percent women against 42 percent 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 centres have been developed as 2 row, 3 rows, 4 row paddy transplanter.[7]

M. V. Manjunatha, b. G. Masthana reddy explained, Studies were conducted at Agricultural Research Station, Gangavathi, Karnataka state during 2002 to 2004 on the feasibility of mechanizing transplanting operations in paddy crop with a view to reduce the cost of cultivation. An eight row self-propelled paddy transplanter was used for the purpose. The performance of the mechanical transplanter was quite satisfactory.[4]

During the period of 2008 A.K. Goel et al. conducted an research on three planters namely OUAT, CRRI and Yanji rice planter. Here they concluded that in accordance with the torn apart plot design of experiments 32 hours of sedimentation period was suitable for operation of manual planter while the same was 57 hours for Yanji planter. In 2013 Rampuram reddy & Dr. N. Sandhya Shenoy conducted an financial examination of Traditional SRI rice farming applies in Mahabubnagar district of Andra-Pradesh. It was concluded that the SRI method of farming is beneficial to the paddy farmers as associated to outdated method.[5]

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/m2. 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. [1]

III. NAME OF COMPONENT

1. Frame
2. Tray
3. Fork
4. Handle
5. Chain & Sprocket
6. Wheel.

IV. METHODOLOGY

The 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 labour. Still the transplanting machines available for the country are imported. Engine driven transplanters are high in cost and the inter-raw, intra-raw 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 law 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 unterminated 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.

V. WORKING

As the method is manual the worker has to provide the initial motion. When the rice planter will move forward the ground wheels will get rotate. The wheels are provided with the fins so that they can travel easily in the mud. The ground wheels are used to keep constant distance between the two successive plants. Then we have larger sprocket is provided on the same shaft with the ground wheels and hence at the same time sprocket will also rotate. Sprocket is in engagement with the smaller sprocket by using the chain drive. As the power will get transmitted to the smaller sprocket, it will rotate.

Speed is increased from driver to driven shaft as we used 3:1 bar linkage so that it will oscillate for certain angle. As the drive is provided by the worker it will not have high speed and hence through this sprocket arrangement we have increase the planting finger speed. As the planting speed ratio. On the same shaft planting finger will be fixed through the four finger will oscillate, it will pick the rice plant from the tray and plant in mud. The planting finger is designed in such a way that rice plant should be easy to pick during the motion and also it should pick during the downward motion only.

In addition some other parameter also provided which even planter machines. This parameters contains height adjuster of main wheel, depth adjuster of picking arm, additional power source to drive the wheel etc.[5]

VI. OBJECTIVE

- To design rice transplanter is to develop the simple system.
- Easy in handling and lower in cost.
- The engine based Rice transplanter machine can also be used, but to make easy working and lower cost we have designed the manual rice transplanter. Mechanical transplanting of rice is the process of transplanting young rice seedlings, which have been grown in a mat nursery, using a self-propelled rice transplanter. In conventional manual transplanting practice, 8-12 labours are required to transplant one acre.
- However, if a self-propelled rice transplanter is used, three people can transplant up to four acres in a day.

Proposed CAD model of rice transplanter.

VII. LIMTATIONS

- Seedlings must be planted while still young, and this makes machine transplanting a more suitable method only in irrigated areas.
- Good nursery management practices are required. E.g. Mat nursery & seedling trays. Special nursery management is needed (mat nursery or seedling trays).
- Proper land preparation, land leveling and water management should be there.
- Fields should be accessible for a smooth entry, exit, and tour of machines.
- Transplanting machines and its maintenance are expensive; so poor farmers cannot afford them (contract hiring of transplanters is available in some countries).
- Problems in poorly prepared and leveled land, or with poorly designed machines.
- Need of training on machine operations makes it time consuming and expensive. Developed with input from M Bell, V
- Fast and efficient (1–2 ha/d), uses less labour and ensures timely planting.
- Reduces stress, work load, and health risks.
- Ensures uniform spacing and plant density.
- Seedlings recover fast, tiller vigorously, and mature uniformly. [8]

VIII. RESULT AND DISCUSSION

Transplanting is a labour intensive operation along with time consuming and health issues related to it. Further from our study we could easily evaluate that high skill is necessary for the operation so as to achieve uniform number of seedlings per hill, spacing between hill to hill and as well as between the rows. It is well known fact that the time available between the harvest of one crop and transplanting of paddy is short. Hence the maximum yield can only be through timely transplanting according to the sessional approach i.e. Kharif session. So it could be said that maximum yield is a function of date of transplanting. These are few factors that basically emphasis the need for a suitable mechanical transplanter in India which suits the small scale labours and moreover which are easy to handle and maintain. Japanese transplanters are hugely successful worldwide, but Japanese transplanter possess certain limitations for introduction in India. These transplanter are very expensive hence looking towards the poor-socio economic condition of labours in our country these transplanter could not gain that much popularity. Japanese transplanters are well composed of complex and precise mechanism which could not be repaired or serviced in the local workshops. According to study in this paper it is clear that out of all the mechanical transplanters a self-propelled type is considered to be more advantageous. But there is need of designing and developing a cheap, simple and effective indigenous transplanter suited to perform well under Indian conditions.

IX. CONCLUSION

As we studied the manually operated rice transplanter with simple mechanism and low maintenance which is affordable for every farmers. Our farmer not only changes the structure of labour in agriculture, but also influence the nature of workload. From 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.

This conceptual design is very helpful for the farmer for better productivity. This machine can be operated by single labour.

Hence we are going to use simple Linkage mechanism which reduces the farmer efforts and it is easy to handle. [ ]

REFERENCES

[1] Uttam kumar and EV Thomas .2015, " Determination of force acting no the ricfe transplanting finger". CIGR Journal, 17(1):3043.

[2] Ravikumar M, Muthuselvan P V, Manivasanthan V, Sanjeev Kumar; " Paddy Transplanting Machine". , Bannari Amman institute of technology, Sathyamongalam, India Nov.2017, ISSN: 2455-8761

[3] Development Of rice planting Machine" Ahire P. K, Bhoir V.D, Patil S.A, Main M.R, Dr.Atl D Dhale, Shvajirao S. Jondhale COE Mumbai, India ,2017 IJIRCT, ISSN:2454-5988.

[4] M V Mnjunatha, B G Masthana Reddy, "Performance of rice under different Method of establishment in tungabhadra canal command , Karnataka ". Karnataka J.Agric. Sci,22(5) (11511152):2009

[5] Mayur Bansode, Sachin Maharnavar, Sandip Bansode, Ajay Bnasode. "Design & Fabrication Of Rice Planting Machine." . May.2019. E-ISSN:2 , P-ISSN 2349-5138

[6] Theory Of Machine - R.S.Khurmi

[7] Shinde Jitendra G, pandit Shamuvel V, Kadam Sunil J. " Review Paper On devlopment Of Rice Transplanter" . Bharat Viddyapeeth's COE,Kolhapur, India Oct 2018, ISSN: 2456-8880

[8] Dr.R.K.Bansal - Strength of Materials, Laxmi Publications.

[9] Design of Machine Element - V.B.Bhandari.