

# LOW COST PAPER POT TRANSPLANTER FOR AGRICULTURE USING SOLAR

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**Abstract:**-In agriculture lack of labour is the main issue. While transplanting the plant the roots may not be transplanted properly due to the labour may not bend for more time for planting purpose. The cost of the machine should also be affordable by the farmers. This paper presents the design and development of solar operated paper pot transplantation machine. The paper pot transplanting system is an innovative, labor saving technology. It relies on using paper pot that are connected in a chain so that they feed themselves through the transplanter.

**Index Term:** Paper Pot, Transplanting, Agriculture, Solar, Battery, Motor.

## I. INTRODUCTION

Agriculture is the backbone of Indian economy. Today, India ranks second worldwide in farm output. About 175 types of vegetables are grown in India, produce 14 of the vegetables crops like tomato, onion, chili, brinjal, cauliflower, cabbage etc. are transplanted. Vegetable transplanting is now carried out all the countries. While transplanting is done manually, roots are severely damaged in the process of transplanting. So the plants take longer to establish their roots after transplanting.

Transplanting of vegetable seedling manually is very tiresome and labor consuming as the operation is done in a bending posture. High labor requirement and shortage of labor during peak transplanting season causes delay in transplanting and affects timely operation.

The paper pot transplanting system is an innovative, labor saving technology. It relies on using paper pot that is connected in a chain so that they feed themselves through the transplanter. The transplanter itself is hand pulled with it, I can put 264 plants in the ground

(one flat) in less than a minute . All while walking upright (no kneeling, crawling or stooping).the transplanter opens a narrow furrow, the paper chain goes down into the furrow, and then the plants are covered by a set of metal flanges at the start of a row, the lead cell of a flat of a paper chain pots is pulled down into the furrow ,staked to hold it in place, and then you pull the transplanter forward .The transplanter all follow each other into the ground. Packing wheels firm, the soil around the transplants as you go.



Fig 1:- Transplanting by hand

## II. Objectives

- Fabricating with low cost materials i.e. Mild Steel.
- For Transplanting paper pots the machine is used for both wet lands and dry lands and it is used for seedling purpose also.
- By using Non Conventional Energy (Solar Power) to run the paper pots transplanter machine.

## III. Methodology

- To study the current model of paper pot transplanter.
- Make out the problems and define it for better solutions.
- Final design concept which is best to fabricate and materials to be used.
- 3-D and 2D drawings were made for fabricating utilizing CATIA V5.
- Prototype model testing and review of the design.
- Fabrication of the model and defining results and conclusion.

## IV. DESIGNING

The design of paper pot transplanter was done using CATIA V5 and the designed model was shown in figure below

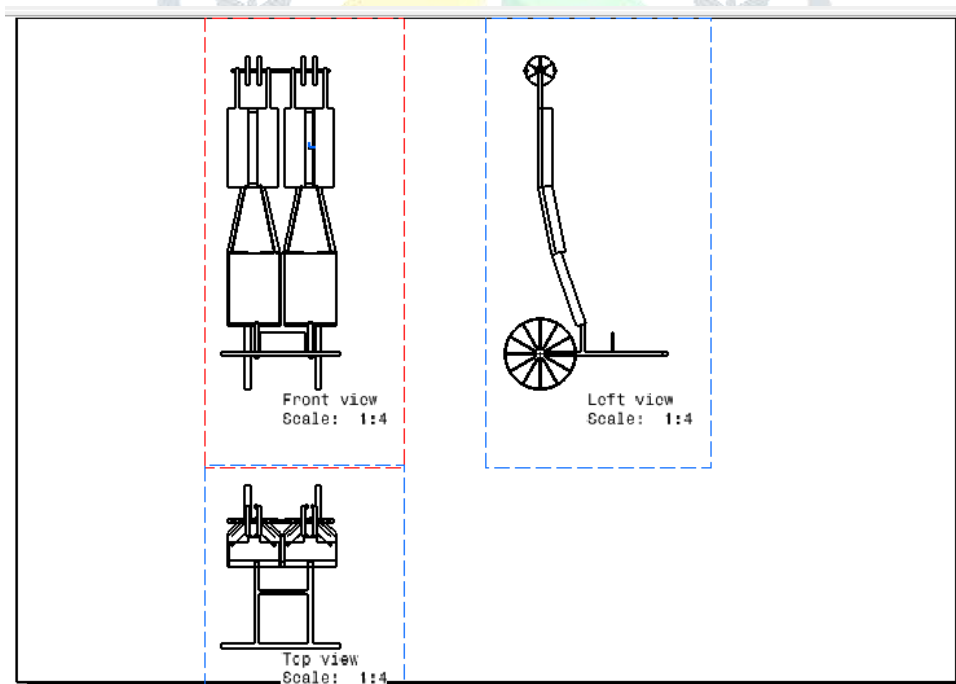


Fig.2:2D view of model

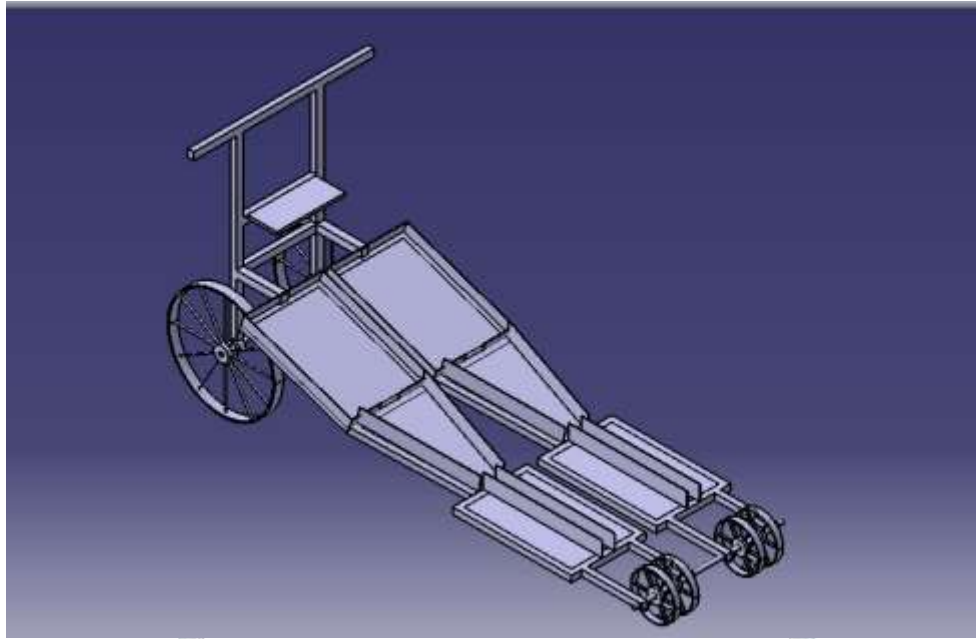


Fig.3:Isometric view of model

## V. Working Principle:

The Paper Pot Transplanter machine has been fabricated and the principle of working is listed below,

- First we have to place paper pots with plants on the tray of the model and at one end we have to fix to the ground at one end because for not to moving the paper pot.
- Secondly we have to switch on the motor so that the machine will move by using solar energy from battery.
- While the machine is in moving condition automatically the paper pots slide down to base frame.
- We have created a furrow at the bottom so that it can make a path for the paper pots to transplant in to the soil.
- The paper pot will transplanted through connecting frame one by one according to the paper pot sizes.
- At the back end we have provided rear wheels and a v-type structure to push the soil which furrow was removed to transplant.
- Likely, there is some different process for seeding process.
- Here we pour the seeds in the top open base this is connected to furrow at the bottom with a pipe so that the seeds will flow from top to bottom with help of pipe.
- Lastly, the furrow will make path for seeds to go into the soil.

## VI. MATERIALS USED

- 15W Solar Panel
- 12V Motor
- Charge Controller
- 12V Lead Acid Battery
- Wheels of 15 -18 inch diameter (front wheels)
- Wheels of 6-8 inch diameter (rear wheels)
- Sheet Metal, Shaft, Frame are made up of Mild Steel

## VII. RESULTS & DISCUSSION:

Welding is the important process involved in the fabrication. The necessary steel material is cut down for the required dimension. The base parts are welded using arc welding machine. Metal frame is cut down for the required dimension. The components like DC motor base of sheet metal and metal frame are weld to together. Manufacturing processes are the steps to through which raw materials are transformed into a final product. These materials are then modified through the manufacturing processes is to become the required part. Manufacturing processes can be treating (such as heat treating or coating), machining, or reshaping the material. The manufacturing process also includes tests and checks for quality assurance during and after the manufacturing.

- For example: The base frame which acts a chassis of vehicle is fabricated with the help of square tubes and channels by metal cutting and metal joining process called welding. The metal wheel with spikes at its surface is mounted at the rear axle of vehicle to obtain a stabilized motion on the muddy field. The rear axle shaft gets attached to base frame with the help of bearing supported ends. The plantlet passage tray which is wide at one end to load the paper pot plantlets and it is narrow at its other end, this narrowed end is placed near the front axle of vehicle. The handle bar is provided at the back side of chassis for handling the vehicle to perform transplanting operation.

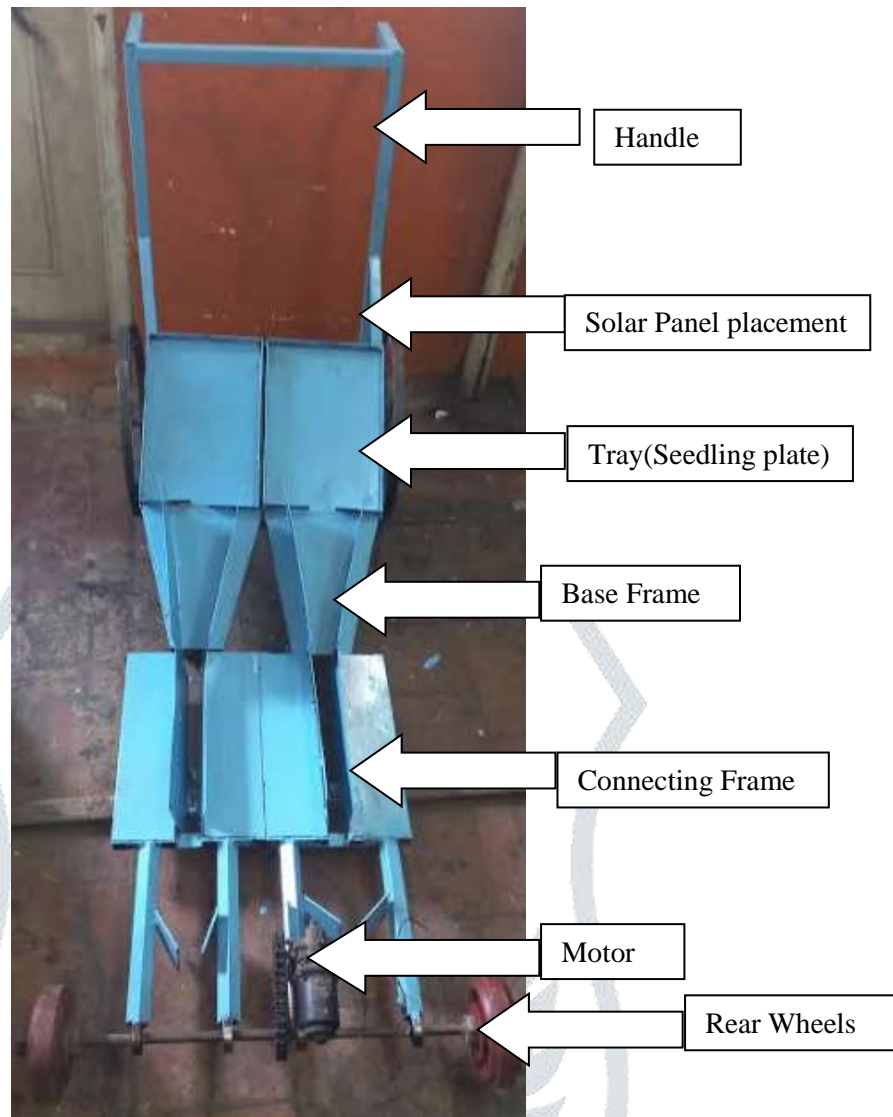


Fig 4. Prototype

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- Initially paper pot plantlets which are ready to be transplanted is placed on the loading chamber of plantlet loading tray, its free end is loosened from the bundle and it gets fixed to the field. Once all the initial arrangements are done, the operator will on the toggle switch and hold the handle and guide the machine to move in a required path. The battery will produce the energy to the motor due to the energy the machine will move and helps to loosen the paper pot taps to loosen from the bundle, narrow passage of tray makes the paper pot tape to flow in a straight path and to transplant it on to the field. Near the front wheel there is a passage to transplant the crop and fix to the field.

## ADVANTAGES

- Reduces the human effort the maximum extent.
- Simple design compared to the existing model.
- Easy to repair by farmer's itself and maintenance is less.
- Pulling force is greatly reduced by decreasing weight of the model.
- This machine can be available for low cost with multiple features.

## VIII. CONCLUSION

- Paper pot machine was designed and fabricated with less cost, easy maintenance and ecofriendly, provides easy and effective farming.
- It is a quick process consuming less time. And there is no consumption of fuel.
- The paper pot seedling transplanting machine worked satisfactorily. But, there were some improvements to be done before introducing to the farmers. The machine is driven by man power but engine can be coupled to enhance the performances.
- Machine can be developed to transplant several rows simultaneously. Weight of the machine should be reduced by removing sprocket, chains. The depot must have thin mud layer for easy removal of seedlings.

## IX. FUTURE SCOPE

- The experiment can be continued further by identifying the errors in the machine which are mentioned in the above report.
- The experiment can be conducted with installing I.C. Engine and we can use as Hybrid Vehicle.
- Different type of model can be designed for more operations and simple use of the machine.

## REFERENCES

1. Kumar GP, Raheman H. Vegetable transplanters for use in developing countries—a review. *International Journal of Vegetable Science*. 2008 Jul 21;14(3):232- 55.
2. Mr.Akshay S kadlag AUTOMATIC PLANTING FARM EQUIPMENT Department of Production Engineering, AVCOE Sangamner.Vol-5 Issue-2 2019
3. SIVAKUMAR S. Development of a tractor mounted automatic vegetable transplanter (Doctoral dissertation, TAMIL NADU AGRICULTURAL UNIVERSITY COIMBATORE).
4. Patil AS, Davane SS, Malunekar SV. Design, development and testing of hand held vegetable transplanter. *Int. J. Adv. Res.* 2015;3(1):247-53.
5. Theurer JC, Doney DL. Transplanted versus direct seeded sugar beets. *J. Am. Soc. Sugar Beet Technol.* 1980 Apr;20(5):503-16.
6. Ding J, Colegrove P, Mehnen J, Ganguly S, Almeida PS, Wang F, Williams S. Thermo-mechanical analysis of wire and arc additive layer manufacturing process on large multi-layer parts. *Computational Materials Science*. 2011 Dec 1;50(12):3315-22.
7. Anonymous. 2008. Agricultural mechanization and energy management. Ministry of Agriculture, Government of India, New Delhi.
8. Dihingia, P.C., G.V.P. Kumar, and P.K. Sarma. 2016. Development of a hopper-type planting device for a walk-behind hand-tractor-powered vegetable transplanter. *J. Biosyst. Eng.* 41 (1):21–33.
9. Feng, D., W. Geng, and D. Zunyuan. 2000. Study on block seedling transplanter with belt feeding mechanism. *Trans. Chinese Soc. Agric. Mach.* 31(2):42–45.
10. Gupta, J.P. and S. Kumar. 2001. Status of power tiller use in Bihar: a case study of Nalanda District. *Agr. Mech. Asia Africa* 32(1):19–22