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Design and Fabrication of Paddy Transplanting Machine

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Abstract: Manual method of seed planting results in low seed placement, spacing efficiencies, and serious back pain which confines the size of the field that can be planted. The cost price of imported planters has gone down. beyond the purchasing power of most of our farmers. Peasant farmers can do much to increase food production. Especially grains, if hard work can be reduced or totally eliminated. Removed from their planting operation. To get the best performance from a seed planter, the above limits are to been handed by proper design and selection of the components are essential for the machine to suit the needs of crops. The demand for a rice trans-planter machine is increasing nowadays because of its unique features in seeding.well arranged and in a good manner. Seeding by rice Trans-planters save so many human beings' struggles. The people who use this type of machine are farmers and the are economically poor. This paper provides directions for growth in rice planters used in India. Rice planting is This is a very old method from many years ago, and having long Their methods of rice planting have been in history for many years. Changed in the last decade. rice trans-planter machine is increased, but current machines are expensive. So the main focus of this project is to reduce the cost of that machine.

Keywords: *Rice planter, cost minimization, design &development.*

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 andequipment's. So, that productivity of farming increases. Agriculture also plays an 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 theprimary food of the India. A large number of farmers is carry the cultivating process and rice production. Presenting the newer method to a rice farming will result in many advantages such as: • Better production • Good quality • Less labour required • Saves time • Low cost. Today, As India is facing a huge problem of child labour and farming. The abovepoint is that child labour and farming are interconnected to a great amount. If the farming technology rises, it reduces the labour requirement. This will help the country to throw away two major problems. The maximum number of workers required in rice planting is for planting i.e., seed planting. Many new instruments are developed and improved in order to saving the energy and get more end result in this process. Arice planter is being developed countries like China, Japan, etc.it is at present taken in use. But here in India the rice planter machine not economical to farmer due to high price. The rice planter in remote nation is run on diesel engine. The current situation of the Indian farmers is not well sufficient to purchase the planters to use it. So, a manual rice planter is being developed in India so reduce the cost of planter. In manual method of rice planting requires, 8-11labors are required for one acre planting. Though, if a automated rice planter is used, three people can transplant able to four acres in a day.

II. LITERATURE SURVEY

Rajvir Yadav et al. (2007) had accompanied an ergonomic valuation of six row manually operated rice planter. Under their study the field capability of planter was higher than as compared to manual method and average force required for pulling the planter was considered to be 131.32 Nfor male and 146.12 N for female subjects.

Martin and Chaffin (1972), McDaniel (1974), and Chaffin et al. (1983) found that heights at which push-pull forces are applied are the most significant flexible which massively disturbs the force output.

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 manualplanter while the same was 57 hours for Yanji planter.

In 2013 Rampuram Reddy & Dr. N. Sandhya Shenoy conducted a financial examination of Traditional SRI rice farming applies in Mahabubnagar district of Andra-Pradesh. Itwas concluded that the SRI method of farming is beneficial to the paddy farmers as associated to outdated method.

The various information regarding the rice planter taken from various research articles. The literature review is distributed into dissimilar field of examination like Ergo-Economical analysis of different paddy planting operation, performance of self-propelled rice planter and its effect on crop yield, theoretic growth of rice planting machine. This development and experiments were conducted which gives the parameters, specification, problems arising in already exists planter and progress& design procedure of planter. The unobtainability of the rice planter in western Maharashtra zone gave the reason to find proper research in this zone and designing planter. The lack of knowledge of use of this planter in the farmers which indications to makes the convenient use. The research and literature on the design analysis of hand cranked and self-propelled with the cam- follower mechanism.

WORKING

As the method is manual the worker has to provide the initial motion. When the rice planter will move forwardthe 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 andhence through this sprocket arrangement we have increase the planting finger speed. As the planting speed ratio. On thesame shaft planting finger will be fixed through the four fingerwill oscillate, it will pick the rice plant from the tray and plant in mud. The planting finger is designed in such a way that riceplant should be easy to pick during the motion and also it should pick during the downward motion only.

Availability of rice planter are is in varied choice and verity ofseveral things in the agriculture market. But those machine are very complex and has various part this increase price of machine.

METHODOLOGY

A. Diagram:

Fig1.Actual Model

A.Components:

1. Frame: It is made up of M.S. angle bar on whichother components like hopper, disk, shaft etc. are mounted.

2. Shaft: It is made of M.S. on which disc and four gear sprocket is mounted. It is used to transfer the power from ground wheel to each disc.

3. Chain: The chain is made up of no. of rigid links which are hinges together by pin joints in order to provide. The required exibility for wrapping round the driving and driven wheels. These wheels have projecting teeth of special profile a fact into the corresponding recess. Links of the chain. The to other wheel are known as sprockets wheel. Which transfer the motion.

4. Hopper: It is made of rectangular M.S. material which is used for cultivating the soil be for dropping the seed.

DESIGN OF SYSTEM

For frame design as shown in the figure we consider that Mass of rice plants is 5kg & Mass of frame and accessories is 20kg.

Total Mass (M) = 25kg (Assuming)
Total Force (F) = M× g (1)

Where (g) is acceleration due to gravityF = 25×9.81 N, F = 245.25 N

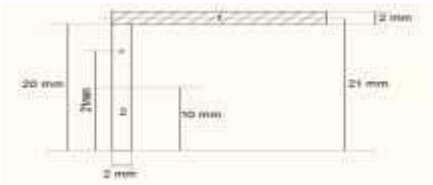

Fig 2: Layout view of frame

There are four key points where total weightacts on links, so considering load is distributedequally at each point i.e. each link. Force acting on each link is given by

F1 = F/4------(2)

F1= 245.25/4 = 61.31N

Length of link 1 is 910mm so bending moment (M)

for link 1 is given by M = F1× L1 --- (3)

M = 61.31 × (910/1000)M = 55.79 N-m

We are using M.S angle over MS flat because M.S angle has comparatively high strength in twisting & bending than MS flat. So, selecting M.S angle of (22 × 22 × 2) mm dimensions.

Calculating Moment of Inertia for M.S angle (Ig)Ig = (b × d^3 / 12) (4)

Here,

σ permissible = Sut / Nf

σ permissible = 650/2 = 325 N/$mm^2$$I_{G1}$ = (22 x 2^3)/12 = 14.67mm^4

I_{G2} = (20^3 x 2)/12 = 1333.34mm^4

y = C.G. of the system= (A_1y_1+A_2y_2)/(A_1+ A_2) -------
(5)

y = [{(22 x 2) x 2} + {(20 x 2) x 10}] / {(20 x 2) +

(22 x 2)}

y =15.76 mm

Now, I_P = Moment of Inertia about parallel axis.

Ip = (I_G+Ah^2) (6)

So, IP1 = (IG1+A1 h12)

I_{P1} = 14.67 + {44 x (21-15.76)^2}I_{P2} = 1222.804 mm^4

IP2 = (IG2+A2 h22)

$I_{P2} = 1333.34 + \{40 \times (15.76 - 10)^2\} I_{P2} = 2660.44 \text{ mm}^4$

So, Moment of inertia

$I = I_{P1} + I_{P2}$ $I = 1222.804 + 2660.444$

$I = 3883.248 \text{ mm}^4$ We know that,

$(M/I) = (\sigma/y)$ ---------- 7)

$\sigma_{actual} = (M \times y)/ I$

$\Sigma_{ACTUAL} = (55.79 \times 10^3 \times 15.76) / 3883.248$

$\sigma_{actual} = 226.42 \text{ N/mm}^2$ As,

$\sigma_{actual} < \sigma_{permissible}$

SO, DESIGN IS SAFE.

ADVANTAGES

1. It saves labour charge.
2. It saves working time and saving on cost of operationas compared to conventional method of previous country plough.
3. It is light in weight as compared to present devices.
4. It reduced the use of man power up to 50-60 percent.
5. It is cheaper so poorer farmer can also afford these new devices.
6. The plough enters into the soil and automaticdropping of seeds takes place.
7. It can be used also for several seed

CONCLUSION

Transplanting of seedling at the optimal age (24-30days) ispossible constant spacing and optimum plant density can be maintained so that its output can be increased. It reduces the stress, drudgery and health risk of farm labours. By using this machine the problem of shortage of labours can be overcome. As it is independent of engine, this is affordable to poor farmers also.

FUTURE SCOPE

In future, it is applicable to all type of crops whether it is costly or cheaper machine. In future there is also some advanced modification is possible to like on the basis of the sensor. Further solar energy can be used to operate this machine.

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