International Journal of Multidisciplinary Research and Development
Online ISSN: 2349-4182, Print ISSN: 2349-5979
Impact Factor: RJIF 5.72
Received: 09-05-2018; Accepted: 15-06-2018
www.allsubjectjournal.com
Volume 5 Issue 6; June 2018; Page No. 92-93

Rice planting and seedling machine

Hanumant Kate[1], Prashant Sutar[2], Siddheshwar Yejge[3], Pradeep Thavare[4], Rohit Yadav[5]
[1]Assistant Professor, Department of Mechanical, DYPCOE, Ambi, Maharashtra, India
[2-5] Student, Department of Mechanical, DYPCOE, Ambi, Maharashtra, India

Abstract
India is widely known in the world for its agricultural activities. Farming is one of the important commercial businesses. Still in our country enough importance is not given to the improvements in the agricultural field. The traditional methods of farming are not able to satisfy all the need of the farmers effectively. The current growth in the agriculture sector is not very satisfactory as compared to other sectors. The farmers are much dependant on bullocks or tractors and are unable to bear up with its increasing cost. Hence we can see large number of suicide cases of farmers now days. Thus there is need to mechanize this sector with the least possible cost.

Keywords: rice transplanter, process parameters, labour utilization, seedling machine

1. Introduction
Status of Agriculture in India
India is a country of villages, having large population around two third of its population are dependent on agriculture. Although agro industry is accreted of lingering peace. The sole culprit for slogging in pace of accretion (in agro industry) is “dependency on traditional approaches and equipment. For enhancing the per capita agricultural production, various innovative efforts are made at national level under the name “Agricultural Revolution.” Revolution is confined to economic growth which may result from various economic factor but technological progress have been and will continue to be the primary source of development. Technology refers to the application of scientific knowledge for practical purpose as well as industrial process for enacting and enriching goods and services.

2. Materials
List of Material

Table 1: List of Material

S. No.	Name of Component	Material	Material specification
1	Frame	M.S	Cheap, durable, good strength
2	Tank	Plastic	Light in weight, durable
3	Hub	Steel	Flat nozzle for 4 bar pressure
4	Adjuster bar	Steel	Durable, light in weight
5	Link	M.S	Cheap, durable, good strength
6	Wheel	Rubber	For friction purpose without indentation
7	Hoses	Rubber	Durable, light in weight, for 4 bar
8	SPROCKET	M.S.	Hard, Light in weight
9	Shaft	M.S	Cheap, durable, good strength

3. Working
A single person can easily operate this seed-sowing machine. It consists of bucket with two compartments. One for planting and other for seeds. The compartment of planting is larger than that of seeds (i.e. 3 kg of seeds capacity and 6 kg of plantings). The bevel gear transmits power from wheels to the indexing plate, which has slots for seeds as well as plantings. Accordingly, seeds and plantings are carried along the pipes, which are connected to furrow opener at the bottom. The furrow opener helps in loosening of the soil. The seeds should be placed at or sowed at 20 cm from each other along with depth up to 2.5cm in soil. The chain placed below mechanism helps in covering the seeds and plantings by soil. Approximately 0.3 to 0.4 hectares (ha) of land can be covered in single working day of 8 hours of operation with speed of machine about 1.5 kmph.

4. Figures
Actual Model

Fig 1

5. Design

Design of Frame

Let us assume that,
Weight of rice plant=5kg,
Weight of frame & other accessories=20kg,
Therefore,
Total weight of the model=25kg …….. (Assuming)

Force $=W \times g$
$=25 \times 9.81$
$=245.25N$

There are 4 key points as shown in the figure where total weight acts. So, considering load is distributed equally at the each point i.e. on each each link.

Force acting on each link (F_1) = 245.25/4
$F_1 = 61.3125N$

Let,
L_1=Length of link 1=910mm
So, Bending Moment (M) for link 1 is given by,
$M = F_1 \times L_1$
$=61.3125 \times (910/1000)$
$=55.7943$ N-m

We are using MS angle over MS flat cause MS angle has comparatively high stenght in twisting & bending than MS flat.

So, Selecting MS angle of (22 x 22 x 2) mm dimension.
Calculating Moment of Inertia for MS angle (I),
$I_G= (bd^3/12)$
$\sigma_{Permissible} = (S_{ut}/N_f) = (650 / 2) = 325\ N/mm^2$
$I_{G1}= (22 \times 2^3)/12 =14.666mm^4$
$I_{G2}= (20^3 \times 2)/12 =1333.33mm^4$
y=C.G. of the system= $(A_1y_1+ A_2y_2)/(A_1+ A_2)$
y= [{(22 x 2) x 2} + {(20 x 2) x 10}] / {(20 x 2) + (22 x 2)}
y= 15.76mm

Now, I_P= Moment of Inertia about parallel axis.
$= (I_G+Ah^2)$
So,
$I_{P1}= (I_{G1}+A_1 h_1^2)$
$= 14.666 + \{44 \times (21-15.76)^2\}$
$=1222.80\ mm^4$
$I_{P2}= (I_{G2}+A_2 h_2^2)$
$= 1333.33 + \{40 \times (15.76 - 10)^2\}$
$=2660.434\ mm^4$

So, Moment of inertia (I),
$I= I_{P1} + I_{P2}$
$= 1222.80 + 2660.434$
$I = 3883.234\ mm^4$

We know that,
$(M/I)= (\sigma/y)$
$\sigma_{actual}= (M \times y)/ I$
$= (55.7943 \times 10^3 \times 15.76) / 3883.234$
$= 226.439\ N/mm^2$

As, $a_{ctual} < p_{ermissible}$
Design is safe.

6. Conclusion

The economy is the most highlighting feature of this machine as it does not require any electric power & is independent of tractor or bullocks which are unaffordable to poor farmers.

Farmers face the problem of non-availability of bullocks as well as tractors during the peak period of sowing. Hence, they are tempted to hire them at an increased cost. By making use of manually operated seed cum planting drill, the yield loss can be substantially decreased. The most important advantage of manually operated seed cum planting drill is that - it can be easily driven by a single person. There is hardly any problem of manpower in rural areas where the average size of the family is large. Thus, if 2 to 3 people are employed for the sowing operations, the area coverage can be increased. The low cost of the machine as well as its ability to carry out planting, is certainly a boon to the farmers thereby saving much of their time. It results in almost 60 % saving in operational cost and 15% saving in plant requirements. If the machine is commercially exploited, it can be proved to be beneficial to poor farmers.

7. References

1. Awadhwal NK. Development of an animal – drawn rice metering device, Indian J Agric Sci. 1988; 58(2):87-90.
2. Awadhwal NK, Shetty SVR, Niangado o, Traore MB. Development and testing of a donkey – drawn cultivator – cum –rice er. Agric. Mechanization in Asia, Africa and Lat. Amer, 1990b.
3. Y Lan, MF Kocher, JA Smith. Opto – electronic Sensor System for Laboratory Measurement of Planter Rice Spacing with Small Rice s. i Journal of Agricultural Engineering Research, 1999; 72:119.
4. JW Panning, MF Kocher, JA Smith, SD Kachman. Laboratory and Field Testing of Rice Spacing Uniformity for Sugarbeet Planters. i Applied Engineering in Agriculture. 2000; 16(1)7.