

Design and Fabrication of Low Cost Single Seed and Multi Seed Sowing Machine

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Abstract- The basic requirements for small scale cropping machines are, they should be suitable for small farms, simple in design and technology and versatile for use in different farm operations. A single seed sowing machine is designed and developed to improve planting efficiency and reduce drudgery involved in manual planting method. Seed planting is also possible for different size of seed at variable depth and space between two seed. Also it increased seed planting, seed/fertilizer placement accuracies and it was made of durable and cheap material affordable for the small scale peasant farmers. The operating, adjusting and maintaining principles were made simple for effective handling by unskilled operators (farmers).

Index terms- Seed Sowing Machine, Forming, Advance Machine, Agro-Machinery, Multigrain

I. INTRODUCTION

This Indian economy is based on agriculture. Development in agriculture leads to raise economic status of country. In India farmers are facing problems due to unavailability of labours, traditional way of farming using non efficient farming equipment which takes lot of time and also increases labour cost. This is all about enhancement in seed sowing and fertilizer like farming operations by using manual operated seed sowing machine. Hence for achieving best performance from a seed planter, the above limits should be optimized. Thus need to make proper design of the agriculture machine and also selection of the components is also required on the machine to suit the needs of crops. Traditional method of seed sowing based on assumptions of seed

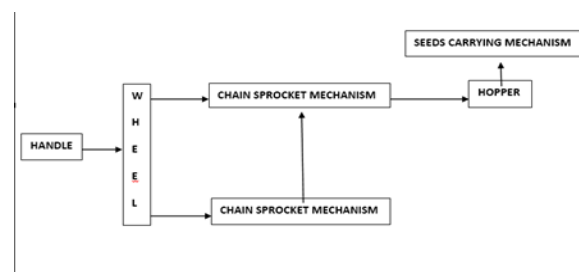
to seed spacing and depth of placement which is not at all efficient and beside this it requires lot of time and efforts too.

Seeds Name	Dimension
Cotton Seeds	5mm
Soya bean	5.5mm
Fertilizers	2.5mm
Gram	5mm
Wheat	3mm

II. OBJECTIVE

- To maintain the same distance between two seeds at the time of sowing process.
- Developed machine will be mostly used by the farmers for producing high yield crops with the minimum investment.
- Reducing the investment of the small farmers.

III BLOCK DIAGRAM



IV. FACTORS AFFECTING SEED EMERGENCE

Mechanical factors, which affect seed germination and emergence are :

- a. Its depth should be uniform with regard to placement of seed.
- b. It should be distributed uniformly along the rows.
- c. Its transverse displacement with regard to row also considered.
- d. Loose soil getting is also prevented.
- e. Soil is covered uniformly over the seed.

V. EXISTING SYSTEM

At present seed plantation is done by manual method as well as tractor operated method. In manual method after preparation of soil, sowing is done by hands by digging and placing the seed. The cotton seed is placed at a distance of 60-65 cm gap between two seed. It requires skilled labour. Large human labour and skilled workers are required in manual method. Heavy cost is incurred in tractor operated method. This machine is an outcome of need of reducing labour involved in manual method and also to reduce cost of plantation and hence to increase margin of profit.



VI. PROBLEM FORMULATION

1. Timeless is of extreme important in the majority of planting operations, it is desirable that a planter be able to perform these functions accurately at fairly high rates of speed.
2. Single person can make our work of seed sowing instead of 7-8 labour and more.
3. Compact the soil around the seed to prevent rapids loss of moisture from the soil around the seed.

4. Should not damage the seed not affect the germination, i.e. seed should be placed in soil in such a way that all the factors affecting germination and emergence will be as favourable as possible.
5. Deposited the seed in acceptable pattern.

VII. FABRICATION

For proposed work following components are fabricated.

A. SPROCKET

A sprocket or sprocket wheel is a profile wheel with teeth or cogs that mesh with chain track or other preferred or indented material. The name sprocket applies generally to any wheel upon which radial projection engage a chain passing over it .sprocket which is used for the transmit the rotary motion between to shaft or gears .the material which is used for the sprocket t is cast iron which is most common and economical material for sprocket

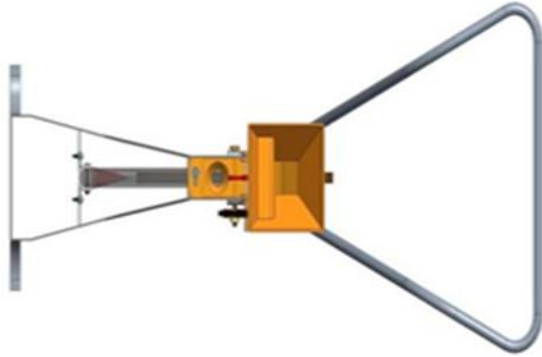


B. CHAIN

Chain which is most important part of the mechanism the chain drive is way of transmitting mechanical power from one place to another .the power is conveyed by a roller chain knows as the drive chain or transmission chain passing over a sprocket gear with the teeth of the gear meshing with the holes in the chain .the material which is used for chain is alloy steel.

C. FREEWHEEL

The free wheel which is part of mechanism it transmit the power in only in one direction it can transmit the power in reverse direction in a mechanical or automobile engineering a free wheel or overrunning clutch is a device in a transmission that disengages. The material of freewheel is alloy steel used.



D. BEARING

A bearing is a machine element that constrains relative motion to only the desired motion and reduces friction between moving parts. Lubrication is used to reduce friction. The bearing is a device is used to enable rotational or linear movement while reducing rotational or linear movement while reducing the friction and handling stress which reduce the friction between the surface of the bearing and surface its rolling over.

E. VANES

The vanes is the most important part of the mechanism vanes is small cup shape structure which is allow to collect only one or two seed from the hopper.

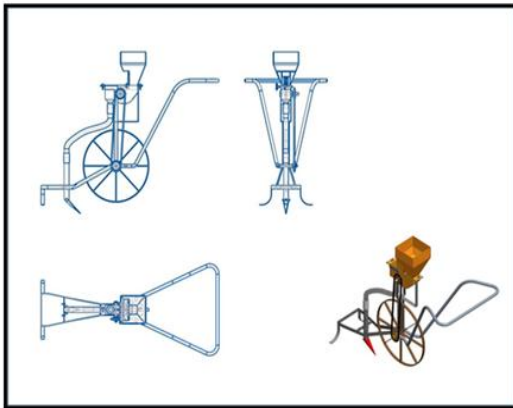


Fig. ANSYS Drawing Of Project

VIII. WORKING MECHANISM

When the equipment is pushed forward by using handle, wheel rotate. At that time the chain sprocket mechanism will be in a motion this motion is transferred to vanes which is held inside the hopper and due to this motion vanes rotate in a clockwise

direction with carrying the seed as per our requirement this seed go inside the pipe which is connected from hopper to ground, seed goes to the weeding from the pipe . As man pull the machine due to this force the shovel shear the soil and digging up to 3-5cm of soil and cover the soil.

IX. CALCULATION

WHEEL:

Radius of wheel = 28.64cm
Circumference of wheel = 180cm

HOPPER:

Length = 30cm
Breadth = 45cm
Height = 30cm
Bottom length and breadth = 12 x 15cm

SHOVEL:

Radius + 12cm = 28.64 + 12 = 42cm
Radius of curvature of bend portion = 120mm

VANES:

For 1 foot distance,
Angle of vanes = 60degree
No of vanes = 6

CUP OF VANES:

Length of cup = 1.5cm
Curvature of cup = 170degree
Force exert by human on handle = 45newton
Walking speed of human without load = 1.4m/sec
Force required to shear the soil:
Weight of machine = 15kg
Force = mass * acceleration
= 15/9.81 * velocity/sec
= 15/9.81 * 0.0041 * 1/4
= 0.006289N

TORQUE:

D – Displacement of wheel.
F – Force exerted by human
Torque = displacement of wheel* force
= 45*0.3
= 13.5N/m

DRAG FORCE ON SHOVEL:

$F_d = C_d * A * \text{Density of black soil} * V * V/2$
WHERE,
 $C_d = \text{drag force coefficient of soil} = 0.15$

A= area of shank
 V = velocity of human = 1.4m/sec
 Density of black soil = 1.33×10^{-6}
 Area of shank surface (A)
 $A = \pi r(r+(h/2+r/2))$
 $r = 0.120\text{m}$
 $h = 0.05\text{m}$
 $A = 3.14 \times 0.120(0.120+(0.052+0.1202)/2)$
 $= 0.09424\text{m}^2$
 $F_d = C_d \times A \times 1.33 \times 10^{-6} \times 1.4 \times 1.4/2$
 $= 1.8424 \times 10^{-8}$

BENDING MOMENT OF ROD:

$\sigma_b = M/Z$ WHERE,
 M = Bending moment
 Z = Modulus of rigidity
 M = drag force * length of rod
 $= 1.8424 \times 10^{-8} \times 0.56$
 $= 1.0317 \times 10^{-8}$
 $Z = 3.14/32D \times (D^4-d^4)$
 Where,
 $D = 0.016\text{m}$
 $d = 0.014\text{m}$
 $Z = 1.6640 \times 10^{-7}$
 BENDING MOMENT OF ROD = 0.6200N/m^2

X. CONCLUSION

Our goal was to build a system which is efficient to perform some various applications with the scope of improvement, the project is done to fulfil the demands of agricultural applications. The main objective of our project was to fulfil the need of farmers suffering from the problems of increasing cost of plantation, labour cost and availability. As it is operated by single person and the operations of digging, placing the seed at constant interval of distance and covering of seed with the soil is done simultaneously. With this machine percentage reduction in time required for plantation has been reduced And reduction in labour cost as compared to conventional method. It has solved the problem of traditional way of seed plantation. Since the capital cost is essential factor while selecting type of equipment for farming. This machine has very less capital cost as compared to other type of machines and also principal advantages of having eco-friendliness and easy troubleshooting. By undergoing all this discussion and undergoing all the factors

associated with Seed Plantation, this machine will be beneficial for the Indian Agriculture.

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