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Organic Fertilizer Spreading Trolley

#1Suraj Thorat , #2Gaikwad Sushant P., #3Devrukhe Ajay S., #4Tuyedekar Rahul L.
#5Khemkar chandrakant S.

1babloo501thorat@gmail.com
2sushantgaikwad342@gmail.com
3ajaydevrukhe2@gmail.com
4rahul.l.t23@gmail.com
5ckhemkar@gmail.com

#1234 Student, Final Year Mechanical Engineering, ISB&M School Of Technology, Pune, Maharashtra, India.
#5Assistant professor, ISB&M School Of Technology, Pune, Maharashtra, India.

ABSTRACT

the project work consist of farming related problems faced mainly at operation spreading of the organic fertilizer and in order to reduce the manual work which may prove to be very hard and ugly and also time consuming. Hence the project work aim on focusing on minimizing the manual effort and making mechanical attachable rotor to have effortless and less time and money consuming work. The project consist manufacturing of a removable rotor which would spread the organic fertilizer. The motion is given the rotor by the wheels of the trolley itself through the chain drive. As the trolley cuts the distance the rotor will spread the fertilizer by itself. The quantity of the fertilizer can be varied through the gear.

Keywords— chain, rotor, sprocket, gear.

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I. INTRODUCTION

Indian economy is still based on agriculture but in India the farming is done by traditional methods. The fertilizer is also spread in India by manual but in other developed countries they uses heavy machines to spread the fertilizer.The method for spreading the fertilizer is by men. They uses bucket and spreads over the farm which is time consuming and ugly work. Now a day in developed countries they use heavy machines to spread the fertilizer but it is not possible for Indian farmers by economical consideration.So we are trying to make an removable attachment which would attached to the trolley and would work on simple gear and rotor arrangement and would spread the fertilizer equally in less time less cost.

II. LITERATURE REVIEW

[1]UKOJE, J.A.1 and *YUSUF, R.O.2 Emphasis on increase agricultural productivity of small holder rural peasants from the perspective of soil conditioning has been on chemical fertilizer while the impact of the bio-organic input has been neglected. This paper examines this issue through a combination of review of available literature and a micro survey of 120 farmers purposively selected from Sabon-gari local government area of Kaduna state, Nigeria. Using a checklist of questions, data were collected for three farming seasons and simple descriptive techniques were employed in data analysis. The study reveals that acreage among the respondents was very small (2-5 acres mostly) and this has no significant impact on chemical fertilizer utilization. Organic fertilizers used include soil from waste dumpsite, cattle and poultry waste and crop residues. These non- chemical fertilizers are consistently used (>50%) and the costs are cheaper than the chemical fertilizers though with some drawbacks such as not being readily available in required quantity and longer duration of releasing nutrients required by plants. To maximize overall socioeconomic and environmental benefits of organic fertilizers, the recommendations proffered include developing an integrated multidisciplinary soil fertility restoration that will incorporate farmers' perception into mainstream research; implementing a reward system for farmers and researchers who utilize inorganic fertilizers.

[5] A.C.Mishra And K.S Negi an experiment conducted in rainfed sub temperature hills of uttarakand with a clarysage genotype EC314327, in to these form Germany, by applying 3 organic of 150:80:100 kg/ha along with control. Result inducted that maximum spike yield (104.67g/plant) and 6.61kg/plot were obtain with application of NPK follow by FYM (81.33gm and 5.96kg, respectively). Harvesting of inflorescence at complete petal fail stage (during late July) was the best time in relation to essential oil percentage.

[2]Yeboah. S. , Akromah. R. a study was conducted at the agriculture research station, anwomaso during the 2008 measure growing season to evaluate the effect of the organic (poultry manure) and inorganic (chemical) fertilizer on the growth and yield of Artemisia annua. The experiment also examined the effect of variation in the stage of harvest on artemisinin yield. The experiment was arranged in a randomize complete block design with 3 replication and 6 treatment .The treatments were 0,45 and 90 kg-n/ha compound fertilizer and poultry manual at 2, 4, 6, tons/ha. Data were collected on: plant height, canopy spread, steam width, number of branches per plant, fresh and dry leaf yield. The result indicated that the treatment significantly affected most of the parameter when compare to the control. Application of 4 tons/ha poultry manual gava the highest artemisinin yield of 9.57 and 37.24 kg/ha at both stages harvest respectively. Leaf yield positively correlated with artemisinin yield. Artemisinin content recorded at preflowering was higher than values recorded at full bloom. From the result, it is recommended that application of 4 t/ha poultry manure can enhance artemisinin production.

[3]Shankar. L. Laware. In order to study the effect of organic fertilizer on growth and yield components in rice, an experiment was carried out in 2008 and 2009, in randomized block design based on 4 replications. The chicken manure, cow manure and paddy rice were mixed together in 1:1:0.5 ratio to from organic fertilizer. The treatments of organic fertilizer were given in 5 levels (0.5, 1.0, 1.5, 2.0 and 2.5 ton/ha). At one level organic fertilizer 1.5 ton/ha was mixed with inorganic fertilizers (N-50, P-25, K-25 kg / ha) and recommended dose of inorganic fertilizer-NPK (N=100, P=50, K=50 kg/ha) was used as check. The plants without treatments were served as control. Grain yield and its components were significantly increased in all the treatments over control. The maximum grain yield in 2008 (4335.88 kg/ha) was noted in plants treated with 2 ton/ha organic fertilizer and it was (4662.71 kg/ha) for 2009 for plant treated with combination of chemical fertilizer + 1.5 ton/ha organic fertilizer. An increase in the grain yield at the abovementioned treatments was may be due to the increase of 1000-seed weight, panicle number, number of fertile tiller, flag leaf length, number of spikelet, panicle length and decrease number of hollow spikelet per panicle.

[4]Morteza Siavoshi. It is important to recognize that fertilizer is not panacea for all of the problems that afflict African agriculture and that promoting fertilizer in isolation from other needed actions will have little lasting impact (Morris et al 2007). African land degradation problems can be attributed to many causes, but analysts generally agree that a contributor is failure of most farmers to intensify agricultural production in a manner that maintains soil fertility. For instance, Nigeria is estimated to have lost 57kg/ha/years during the 2002-2004 cropping season and fertilizer use intensity in 1996-2002 is 5.6kg/ha and percentage increase is 73%. Past efforts at promoting increase fertilizer use include direct subsidies that reduced the price of fertilizer for farmers; government financed and managed input credit programs; centralized control of fertilizer procurement and distribution activities and centralized control of key output markets (with the goal of stabilizing prices and linking input and output marked to ensure smoother credit management).

III.PROBLEM STATEMENT

India is agricultural country but Indian farmer's works on the traditional methods. There are less inventions of the agricultural equipment's .There are several sides of the project in which one of the most important is there is no such an application is yet to be invented as simple as this. There are no Present systems accomplishing this problem completely. So as per our perspective this project lead towards the revolution in present agricultural equipment's industry.

IV.DESIGN DATA

Design of Belt Drive

Selection an open belt drive using V-belt ;

Reduction ratio = 5

Planning an 1 stage reduction;

A) Motor pulley (ϕ D1) = 20mm

B) Main shaft pulley (ϕ D2) = 100mm

INPUT DATA

INPUT POWER = 0.05KW

INPUT SPEED =1000 RPM

CENTERDISTANCE = 210 MM

MAX BELT SPEED = 1600 M/MIN = 26.67 M/SEC

GROOVE ANGLE (2β) = 40^0

COEFFICIENT OF FRICTION = 0.25

BETWEEN BELT AND PULLEY

ALLOWABLE TENSILE STREES = 8 N/mm^2

C/S SYMBOL	USUAL LOAD OF DRIVE (KW)	NOMINAL TOP WIDTH (W-mm)	NOMINAL THICKNESS T-mm	WEIGHT DER METER Kgf
FZ	0.03 - 0.15	6	4	0.05

Table no. 1 Belt section

$$\sin\beta = \frac{O_2M}{O_1O_2}$$

$$= \frac{R_2 - R_1}{C}$$

$$= \frac{D_2 - D_1}{2C}$$

$$= \frac{100 - 20}{2 \times 210}$$

$$\beta = 10.98^0$$

Angle of lap on smaller pulley; i.e.; motor pulley;

$$\theta° = 180 - 2\beta$$

$$= 180 - 2(10.98)$$

$$= 158.04$$

$$\theta = 2.75°$$

Now;

Mass of belt /meter length = 0.05 kgf

Centrifugal Tension (T_c) = Mv^2

$\therefore T_c = 0.05\ (26.67)^2$

$T_c = 35.56$ N

Max Tension in belt (T) $= \sigma_{all} \times Area$

= 8 x 20

= 160N/mm^2

A) Tension in Tight side of belt (T_1) = T-Tc

= 160 - 35.56

T_1 = 124.4 N

B) Tension in slack side of belt (T_2)

$$2.3\log\left[\frac{T_1}{T_2}\right] = \theta \times \mu \times \operatorname{cosec}\beta$$

= 0.25 x 2.8 x cosec 20

$$\log\frac{T_1}{T_2} = 0.86$$

$$\frac{T_1}{T_2} = 7.75$$

T_2 = 16 N

POWER TRANSMITTING CAPACITY OF BELT;

$$P = (T_1 - T_2)v$$

= (124.24 - 16) 26.67

P = 3.13 kw

Belt can safely transmit 0.05 kw power

Selection of Belt.

Selection of belt 'FZ 6 x 600 ' from std manufacturers catalogue

MAKE: HELICORD

RESULT TABLE

1.	BELT SELECTED	FZ 6 x 600
2.	Tight side Tension	T_1 =124.24 N
3.	Slack side Tension	T_2 = 16 N
4.	Motor pulley did.(ϕ D_1)	D_1 =20 MM
5.	Pulley (a) diameter (ϕD_2)	D_2 =100MM

Table no. 2 Section of belt

Design of Spur Gear Pair for high Gear

Power = 01/15 HP = 50 watt

Speed = 200 rpm

b = 10 m

T_{design} = 3 N-m

S_{ut} pinion= S_{ut} gear = 400 N/mm^2

Service factor (Cs) = 1.5

Gear pair

Gear-1 = 24T

Gear-2 = 22T

d_p = 36

T = T_{design} = 3 N-m

Now; $T = P_t \times \frac{d_p}{2}$

$P_t = Tangential\ force$

$= \frac{2M_t}{d_p}$

Pt = 167 N.

$P_{eff} = \left(\frac{P_t \times C_s}{C_v}\right)$

$= \left(\frac{167 \times 1.5}{C_v}\right)$

Neglecting effect of C_v as speed is very low

P_{eff}= 250 N --------(A)

Lewis Strength equation

W_T = Sbym

Where ;

$Y = 0.484 - \frac{2.86}{Z}$

$Y_p = 0.484 - \frac{2.86}{24}$

$= 0.364$

S_{yp}= 145.6

Pinion and gear both are of same material

S_{yp}= 145.6 N

$W_T = (S_{yp}) \times b \times m$

$= 145.6 \times 10_m \times m$

W_T= 1456 m^2----------(B)

Equation (A) & (B)

1456m^2 = 250

m = 0.414

selecting standard module =1.5 mm

GEAR DATA

No. of teeth on gear on main shaft = 22

No. of teeth gear on countershaft = 26

Module = 1.5 mm

Design of Spur Gear Pair for low Gear

Power = 01/15 HP = 50 watt

Speed = 200 rpm

b = 10 m

T_{design} = 3 N.m

S_{ut} pinion= S_{ut} gear = 400 N/mm^2

Service factor (Cs) = 1.5

Gear pair

Gear-1 = 11T

Gear-2 = 35T

d_p = 16.5

Where,

b- Face width

d_p - Diameteral pitch

T = T_{design} = 3 N-m

Now; $T = P_t \times \frac{d_p}{2}$

$P_t = Tangential\ force$

P_{eff} = Effective load

$= \frac{2M_t}{d_p}$

Pt = 363 N.

$P_{eff} = \left(\frac{P_t \times C_s}{C_v}\right)$

$= \left(\frac{363 \times 1.5}{C_v}\right)$

Neglecting effect of C_v as speed is very low

P_{eff} = 545 N -------- (A)

Lewis Strength equation

W_T = Sbym

Where ;

$Y = 0.484 - \frac{2.86}{Z}$

$Y_p = 0.484 - \frac{2.86}{11}$

= 0.224

S_{yp} = 89.6 N

Pinion and gear both are of same material

$$\boxed{S_{yp} = 89.6 \text{ N}}$$

$W_T = (S_{yp}) \times b \times m$

$= 89.6 \times 10m \times m$

$W_T = 896m^2$ ----------(B)

Equation (A) & (B)

$896m^2 = 545$

$$\boxed{m=0.77}$$

Selecting standard module =1.5 mm

GEAR DATA

No. of teeth on gear on main shaft	=11
No. of teeth gear on countershaft	=35
Module	= 1.5 mm

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