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DESIGN AND FABRICATION OF MULTICROP THRESHER TO ENHANCE THE SEED GERMINATION RATE

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ABSTRACT:A thresher was developed for threshing seeds. The major components of the machine include threshing, blower and cleaning units. The operation can be done by rotational motion of a cylinder fitted with beater pegs above a stationary grid which results in the removal of the seeds. After beating out, the grains fall through a conveyor grid into the cleaning unit which consists of sieves that undergo reciprocating motion. Whilst the grains are moving over these sieves, a constant blast of air is being sucked through them which blow out materials that are lighter than the grain through blower exit. The machine was designed to be powered by a ½ hp electric motor. It was tested to thresh, separate and clean the seeds. Thus, the optimum operating parameters of the machine were 13% moisture content (wet basis) of seeds and 1500 rpm threshing drum speed. The successful development of this machine is expected to reduce drudgery associated with the traditional method of threshing millet.

Keywords: Threshing, cleaning, separation,cylinder, rotational, beater, pegs.

Introduction

Threshing is the process of loosening the edible part of crop from the scaly, inedible chaff that surrounds it. It is the step in grain preparation after harvesting and before winnowing, which separates the loosened chaff from the grain.

Threshing may be done by beating the grain using a flail on a threshing floor. Another traditional method of threshing is to make donkeys walk in circles on the grain on a surface. A modern version of this is to spread the grain on the surface of a country road and the grain may be threshed by the wheels of vehicles. Industrialization of threshing began in 1786 with the invention of the threshing machine by Scotsman Andrew Meikles. Today, in developed areas, it is now mostly done by machine.

Objectives of Present Study:

1.To Increase the germination rate, To reduce the Breakage of seeds.
2.Less wastage of seeds through blower exit.
3.The product is checked for its quality.
4.Cost effective.
5.To make the operation safe.

Working Principle:

The Multi crop thresher is very simple to operate as it does not require any skill for the operation. The mechanism used is simple and trouble free. The parts are rotor drum, blower and the siever.

i. The machine operates with 0.75 hp of motor with 1250 rpm.

ii.The crop is fed through the Hooper of the rotor drum where the rotor blades are rotating, so the crop inside the drum experiences rubbing and beating action due to which the crop gets separated from the husk, chaff and the seeds.

iii. Later at the bottom there is a way for the crops to flow towards the next phase that is blower where the blower suck the light material that is husk and chaff and blow off from the delivery end side. Next are the seeds and some sticks, fall on to the screen that is the siever where it reciprocates. The seeds fall on that , then the seed and the heavier particles gets separated like sticks etc. And at the bottom we have plate which has a delivery end and the seeds are taken as an output.

Specifications of The Model:

i. Kerb Weight – 70 kgs
ii. Motor Capacity-0.75 hp
iii.Belts used v-belt, 62 inch and 60 inch
iv. Number of blades on rotor drum-24 Blades
v. Number of blades in blower- 4 placed at 90 each
vi.Type of bearing used- Pedestal type 6 nos.

Components Used

Pedestal bearing, Shaft, Fasteners, Angle Plate, Gear, Belt, Motor, Rotordrum, Blower are the components which are used for the construction of the Threshing Machine.

Operations Performed

Fabrication work, Cutting, Welding, Drilling, Grinding are the operations which are performed during the construction of thresher.

THE THRESHING MACHINE

Testing Results

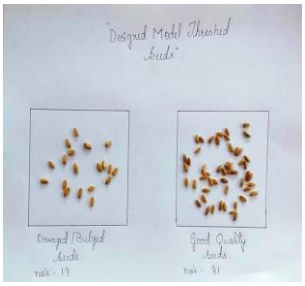
Threshing Efficiency (Te): It is the ratio of the mass of the threshed seed (M_T) to the total mass of the seeds (M_A) expressed in percentage and is given as:

$TE = (M_T/M_A) \times 100$

Threshing Efficiency

Hypochlorite Sodium Test

Sodium hypochlorite is a chemical compound with formula NaClO. It is composed of a sodiumcation(Na^+) and a hypochlorite anion (ClO^-), it may also be viewed as the sodium salt of hypochlorous acid. When dissolved in water it is commonly known as bleach or liquid bleach. Sodium hypochlorite is practically and chemically distinct from chlorine. Sodium hypochlorite is frequently used as disinfectant or a bleaching agent.



Threshi-ng Speed (Rpm)	Total Mass of Seeds,M_A (G)	Avg. Mass Of Threshed Seeds M_T(G)		Conventio-nal Threshing Efficiency (Te%)	Designed Model Threshi-ng Efficiency (Te%)
		Conventional model	Designed model		
1000	2000	1255	1680	62.75	84
1250	2000	1180	1645	59	82.25

Germination Rate

Threshing Speed(rpm)	Conventional Germination Rate (%)	Designed Model Germination Rate (%)
1000	61	88
1250	65	81

Cost Estimation

Cost estimation may be defined as the process of forecasting the expenses that must being incurred to manufacture a product. These expenses take into a consideration all expenditure involved in a design and manufacturing with all related facilities such as pattern making, tool, making as well as a portion of the general administrative and selling.

Detailed Estimate

Sl.	Name of the component	Material	Quantity	Cost
1.	SHAFT	Mild Steel	1	1,050/-
2.	L-ANGLE	Mild Steel	1	1,450/-
3.	FASTNERS	STAINLESS STEEL	45	450/-
4.	PULLEY	Cast Iron	3	1,200/-
5.	MOTOR	Cast Iron	1	1,800/-
6.	V-BELT	RUBBER	2	800/-
7.	SHEET METAL	STAINLESS STEEL	1	950/-
8.	WASHERS	STAINLESS STEEL	45	90/-
9.	WHEELS	STAINLESS STEEL & RUBBER	4	800/-
10.	GEARS	Cast Iron	2	600/-
11.	ELECTRICAL	STEEL &	1	250/-

	CHANGE OVER	PLASTIC		
12.	MANUFACTURING COST	-	-	2,500/-
13.	REPORT	-	-	2,700/-
14.	MISCELLANEOUS	-	-	350/-
		TOTAL COST	RS.	14,990/-

TOTAL COST OF MATERIALS IS RS.14,990/-

Applications:

i. It is used by Farmers, as it is very useful equipment for threshing.

ii. The germination rate of the seeds is increased.

iii.Different types of Crops can be threshed.

iv. It is economical and hence a poor farmer also can afford it.

Conclusion:

Agriculture is the backbone of Indian economy. Technology is an important input in agriculture. Conventional agriculture is replaced by modern technological agriculture. This thresher has an output with increased germination rate. This improves the revenue of the farmer and increases his standard of living. In due course of time, the cost involved in manufacturing this device will payback the manufacturing cost. The operational efficiency and output efficacy multiplies to a greater level.

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