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Design and Fabrication of Spinach Harvesting Machine

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Abstract: Scientifically spinach is called as spinaciaoleracea it grows rapidly, is a short season leafy vegetable and it needs high amount of nitrogen. Efficiency in spinach production is a great concern due to demand.
A leafy vegetable is higher there in cost of production associated with losses of labor costing and higher gap between farmers and modern technology to be used. Breeding is a good strategy to improve such technology for reduction of this gap between farmers and technology to be produced.
The objective of this study was to evaluate and generate such a technology or machine that lines map and decreases coasting and avoiding with help of use a safer modern technology that appreciate economical both environmental condition.
Population are under different levels of costing investment over a farm production and methodology to be used a modern machinesin a hydroponic system and identify quantitative production of spinach for traits related costing and cultivation and production.
Keyword: Cultivation, Costing, Modern technology, etc

I. INTRODUCTION

The modern combine harvester, or simply combine, is a versatile machine designed to expertly harvest a variety of agricultural crops and products. The name that which derives from combines three separate harvesting operations reaping, threshing, and collecting into a single process. Among the relevant by products harvested with a combine are spinach, fenugreek, amaranth leafs, coriander. The partition straw, left lying on the field, comprises the stems and any remaining leaves of the crop with limited nutrients left in it. the straw is then either chopped, spread on the field and ploughed back in or baled for bedding and limited-feed for livestock. Before modern-day machines were developed, agricultural farmers had to harvest crops by carrying out a series of laborious operations one after another. Before harvester farmer had to cut down the crops, spinach with a long-handled cutting tool such as a scythe. After that they had to separate the edible grain from the inedible chaff by beating the cut stalks—an operation known as threshing. Finally, they had to clean any remaining debris away from the seeds to make them suitable for use in a mill. This process take lot of time and people. Thankfully, modern combine harvesters do the whole job automatically: you simply drive them through a field of crops and they cut, thresh, and clean the grains all by themselves using rotating blades, wheels, sieves, and elevators. The grain collects in a drum, buckets in the combine harvester (which is repeatedly emptied into carts pulled by tractors that drive alongside), while the chaff and the stalks spurt from a big exit pipe at the back and fall back down onto the field.Combine harvesters are one of the most economically important labor saving inventions, significantly reducing the fraction of the population engaged in agriculture.

II. LITERATURE REVIEW

A. Dr. SharadS.Chaudhari His aim is fabricate alittle machine to reap a sugarcane which takes power from petrol engine and different mechanisms. Using this machine sugarcane cut faster rate compare to manual harvesting.

B. Joby Bastian The mechanical properties of the material significantly influence the performance of the various unit operation in combine harvester. While checking the mechanical properties it is found that the Young's modulus of the sugarcane stalks as 86MPa, The specific cutting resistance varies between 1764.56 and 957.48kN/m^2, penetration resistance ranging from 29.74kN/m^2 to 56.33kN/m^2 and the crushing force varied from 0.75kN to 1.53kN.this study helped us very much while deciding the forces required to cut the cane in one knocking stroke.

C. R. R. Price - A fiber optic yield monitoring system was developed for a sugarcane chopper harvester that utilized a requirement cycle type approach with three fibre optic sensors mounted in the elevator floor to estimate sugarcane yield. The average observed prediction error on 0.5 to 1.6 Mg estimates was 7.5%; though, the magnitude of the error decreased as the harvested area (tonnage) increased, with an estimated error of 0.03% for 57.8 Mg loads.

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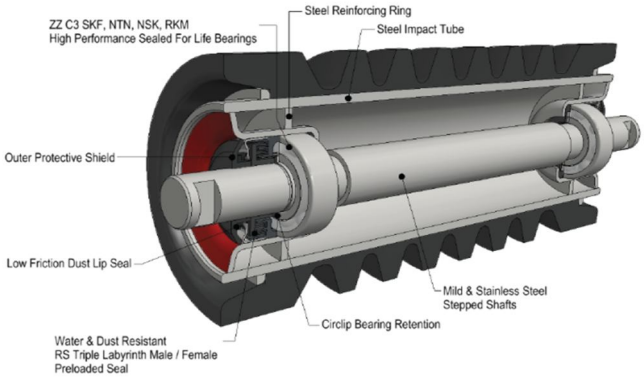
III. COMPONENTS TO BE USED

A. Conveyor

A conveyor belt element is part of mechanical handling system which generally useful for transportation system that moves materials from one place to another. Conveyors are special useful in applications that involving the transportation of heavy or bulky materials. The material may be industrial or domestic purpose Conveyor systems allow quick and efficient transportation for a good and easy to sorting of materials, which make them very punctual within the material handling and packaging industries. Also they have popular consumer applications, which are as often to found in supermarkets and airports. there are different type of conveyor driving mechanism it may be gear drive or chain drive conveyors which are floor and overhead. Conveyors belts are safe transporting way from one level to a different. Conveyor systems are commonly utilized in many industries, including the Mining, automotive, agricultural, computer, electronic, food processing, aerospace, pharmaceutical, chemical, bottling and canning, print finishing and packaging.

Although a good sort of materials are often conveyed, a number of the foremost common include food items like beans and nuts, bottles and cans, automotive components, rubbish , pills and powders, wood and furniture and grain and animal feed. Many factors are important within the accurate selection of a conveyor system.

B. Idler For Conveyor roller



Idlers are crucial to the conveying methods. Which are supports the belt and convey the material along its full length preventing it from stretching, sagging and eventually failing.They typically comprise a steel frame and 1 to 5 rolls Carrying idlers generally consist of a welded steel frame with three equal-sized rolls (one center and two concentrator or wing rolls). Normally, there are two at each end of the conveyor. Sub-categories idlers generally consist of three steel rolls with the concentrator roll tilted at a fixed angle of 20, 35 or 45°. The idlers are fixed to the conveyor frame and normally spaced at 1,2 m [4 ft.] intervals.Training idlerstheseare placed strategically along the conveyor to keep the belt running straight and on center. Belt training (tracking) is vital to reduce spillage and damage to the belt and related structures.

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Impact idlers (both toughing and flat) are used in the loading zone of the conveyor and act as a cushion to prevent belt damage. They comprise three equal-sized rolls with rubber tyres to absorb impact and are spaced at 0,305 m [1 ft.] intervals.
Offset idlersthese are often used for conveying grain, but also suitable for underground mining applications where height clearance is minimal. In contrast to the inline idlers described above, these idlers have an offset center roll. The rolls staggered position supports a broader section of the belt and prevents spillage.

C. Battery

The batteries wherein a reversible response is chargeable for the era of strength such that they can be reverted to state it comes under the secondary category. Recharging is effected by way of passing electric charge in a battery. The oldest sort of rechargeable battery is that the lead-acid accumulator. Lead acid battery marketplace is dominating normally due to the unavailability of any capable competitive answer in the market and they provide lowest cost in line with watt-hour despite in their low unique energy. the preference to make these batteries maintenance unfastened, the flooded battery kind evolved Into editions sealed lead acid or gel cells and valve regulated lead acid (vrla) batteries have much lower specific energy (energy per unit mass) than common fuels like gasoline. In automobiles, this is often somewhat offset by the upper efficiency of electrical motors in converting energy to mechanical work, compared to combustion engines

D. Reel wheel

A slowly rotating wheel called the reel (or pickup reel) pushes the crops down toward the cutter. The reel has horizontal bars called bats and vertical teeth or tines to grip the plant stalks.

E. Wiper Motor

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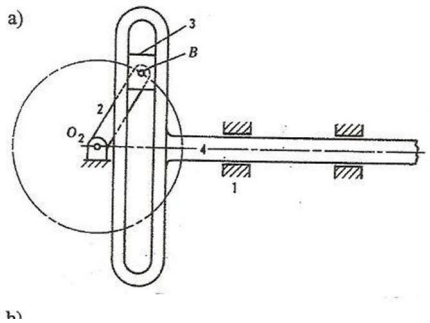
Wiper motor is a special kind of electric powered motor that moves in precisely defined increments of rotor role (steps). The dimensions of the incrementIs measured in degrees and can range relying at the application. Because of unique manage, stepper vehicles are generally utilized in scientific, satellites, robotic and manipulate packages. There are several features common to all stepper cars that make them perfectly suited for those sorts of packages. They may be as underneath high accuracy: perform underneath open loop reliability: stepper cars are brushless. Load impartial: stepper motors rotate at a hard and fast pace underneath special load furnished the ratedTorque is maintained. Protecting torque: for every and every step, the motor holds its function without brakes. Wiper motor calls for sequencers and driving force to function. Sequencer generates collection for switching which determines the path of rotation and mode of operation. Driver is required to change the flux route inside the section windings.

F. Wheels

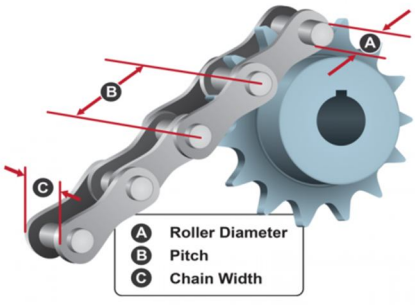
Wheel it is a basic motion transferring device which is a circular block of a sustainable and durable material at the center has a circular hole through which is an axle is placed.Bearing about which the wheel rotates and it reduced friction and provide smooth motion when a couple of force is applied in form of torque and power to the wheel about its axis, they can perform rotational motion. When wheel is placed horizontal on ground under a load-bearing they sustain a load and provide smooth motion, the wheel turning they makes it possible to transport heavy loads.The wheel turning on its vertically makes it possible to control its motion over sleeping and spinning motion

G. Scotch yoke Mechanism for Driving Reaper Blades



Mechanism that which reciprocating motion performed over a rotter motion, it convert an rotary motion into sliding of linear motion with the help of Piston or reciprocating spares to direct couple together for the sliding a yoke including that slot. There engaged a pin at reciprocating part. When the electric wiper motorto convert rotary motion into linear motion with help of crankshaft.Where the Piston and piston rod should be connected together. The Scotch Yoke Mechanism to be successfully efficient because of the rotational motion to spent more time at high point of it rotate than Piston part.

H. Roller Chain



Bush roller chain or roller chain is that the type of chain pressure most usually used for transmission of mechanical power on many sorts of Home, business and agricultural machinery, like conveyors, cord-drawing and tube drawing machines, printing presses, vehicles, motor cycles and bicycles. it consists of a series of fast cylindrical rollers command along by approach of side links. it's miles pushed with the help of a wheel referred to as a sprocket. it's a straightforward, reliable, and inexperienced approach of strength transmission.

I. Sprocket

A sprocket or sprocket-wheel might be a profiled wheel with teeth, or cogs, that mesh with a sequence, music or completely different perforated or Indented material. the name 'sprocket' applies generally to any wheel upon that radial projections interact a sequence passing over it. it is outstanding from a tools therein sprockets area unit by no suggests that meshed conjointly directly, and differs from a machine therein sprockets have teeth and pulleys area unit sleek Sprockets area unit of numerous styles, a most of potency being claimed for each with the help of its conceiver. Sprockets unremarkably do now not have a rim. Many sprockets used with belts have flanges to take care of the Timing belt cantered.

J. Reaper Blade

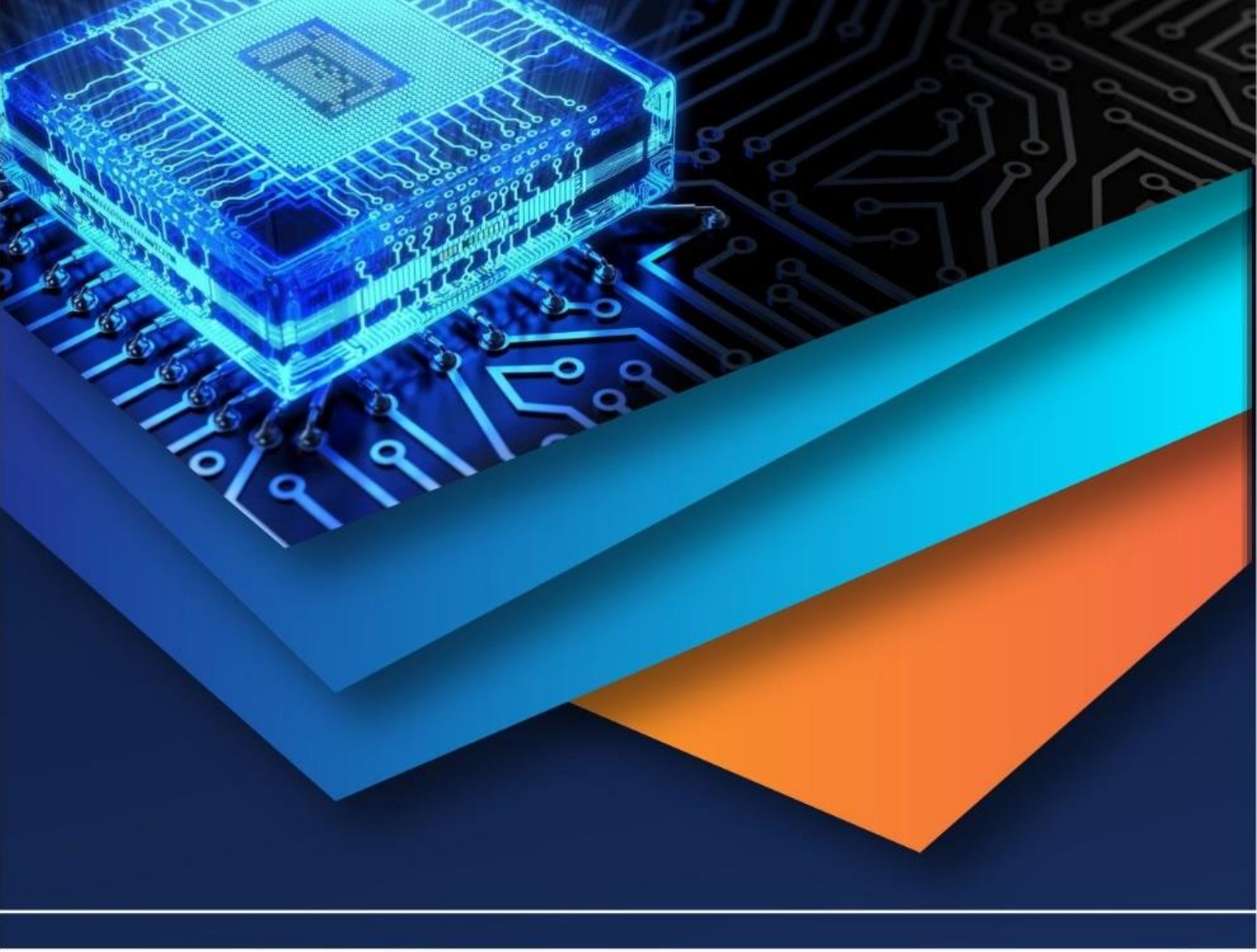
This mechanism is employed in transportable trimmers. If the scale of cutter is multiplied it are often used for cutting stalks with moderate diameter. Reaping is finished by numerous means that, together with plucking the ears of grains directly by hand, cutting the grain stalks with a edge tool, cutting them with a scythe, or a scythe fitted with a grain cradle. Reaping is sometimes distinguished from mowing, that uses similar implements, however is that the ancient term for cutting grass for fodder, instead of reaping cereals. The stiffer, appliance straw of the cereal plants and also the greener grasses for fodder typically demand totally different blades on the machines. The reaped grain stalks square measure gathered into sheaves (bunches), tied with string or with a twist of straw. many sheaves area unit then leant against one another with the ears off the bottom to dry out, forming a stock

IV. CONCLUSION

This designed economical reaping machine which can counter the matter of cutting veggies plants manually for little scale farms. It will be complete that the machine is relatively compact and straightforward to handle. This machine is ready to run of field effortlessly and efforts of farmer ar reduced. the price of reaping victimization this machine is significantly less as compared to manual reaping. The reapers accessible in market ar appropriate for giant farms thus this will be best reaper for the farmers with tiny field.

REFERENCES

[1] S. C. Jain, “Farm Machinery- associate Approach”, PP- 5, 36, 45.
[2] D. S. Sharma and Mukesh Sharma, “Farm Machinery style Principles and problems”, PP- 225-245 [3] L.P.Raut, Vishal Dhandare, Pratik religion, Vinit Ghike, Vineet Mishra, ‘Design, Development and Fabrication of a Compact Harvester’, International Journal for research & Development, vol.2, Issue 10,2014, Department of applied science GHRCE, Nagpur, India.
[3] Arvind C Shivashankar, Vikas R, Vikas V, ‘Design & Development of mini Paddy Harvester’, International Journal for research & Development, vol.3, Issue 05,2015, Department of applied science, BNM Institute of Technology, Bangalore, Karnataka, India.
[4] A.R. Womac , M Yu, C. lagthinathare, P. Ye, and D. Hayes, “Shearing Characteristics of Biomass for Size Reduction



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