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MECHANICAL AID FOR PLOUGHING SOIL AND SOWING SEEDS

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Abstract, *Agriculture is the practice of cultivating plants and livestock. Agriculture was the key development in the rise of sedentary human civilization, whereby farming of domesticated species created food surpluses that enabled people to live in cities. Agriculture is the backbone of the economic system of our country. In addition to providing food and raw material, agriculture also provides employment opportunities to a very large percentage of the population so we have chosen agriculture to help the farmers from our side by providing something which is useful to them.*

Keywords— *agriculture; mechanical working; ploughing soil; covering the soil; sowing seeds.*

I. INTRODUCTION

The concept of working with agriculture started with the identification of the problems faced by the farmers in the villages during farming. We have done a survey to find out what are the exact problems and what is the present situation of the farmer.

Place visited:

- Village :-vanamala kanaparthi
- We have visited around 5 farmers along with the sarpanch of the village.

On interacting with the farmers of vanamala kanaparthi we go to know the details of the work they do, and these are questions asked by us during the interaction:

- Do you have enough land to satisfy the needs of your family?
- Is there any lack of labour in your area?
- What is the wage you will be giving for labour per day?
- Are in need of a good machionery(product) aside of good labour?
- Is this area in lack of electricity?
- What are the problems you are facing through electricity in farming?
- Is there any water shortage? What are the major work requirements you should do for growing the crops?
- What are the problems you will face cropping multiple crops?
- Is there any alternative source of income for farmers?
- How do you care for the crop for good yield?
- Will you face any lack of transparency in food production and distribution?

- What kind of sprays ,pesticides and biocides you use?
- What are problems you face after pesticide?
- How many times do you frequently pesticide the crop?
- How do you save your yield during the growth of the crop?
- What problems do you face while you sell the crop in market?
- Will the money be satisfied for your work?

After the successful interaction with farmers we underwent few of the technical and biological problems they do face. And found some of the solution opportunity to clear them.

The opportunities are:

- Farmers are in need of a good machionery rather than a good labour.
- Farmers are facing electricity issue for the production of water.
- Farmers even have shortage of water.
- Problems faced to crop multiple crops.
- Pesticide the crop.
- Protection of crop from the external enviromental or technical problems.
- Earning a good profit in the market.



the paper is organized as follows: Section II talks about the factors responsible for the problems during farming:

II. BASIC NEEDS OF FARMER

India is a developing country, the majority of its population belong to the rural area, and their primary job is agriculture. But it's been decades these rural people are living the same way they used to live 30 years ago. It is because agriculture in India is not a profit-making job anymore. Farmers need resources to grow food. They need many different types of resources. Farmers need natural resources, such as land, air, nutrients, water and sunlight. Farmers themselves need energy so they can work the land. Farmers need human-made tools to work the land. Some resources can be bought at the local market. So farmers also need money to buy resources that are not available on their land.

In this, we are going to list out the problems which are faced by the farmers these days. Major Problems faced by farmers in India are as follow

- *Climatic factors:* Is the crop/cropping system suitable for local weather parameters such as temperature, rainfall, sun shine hours, relative humidity, wind velocity, wind direction, seasons and agro-ecological situations?
- *Small land holdings:* The seemingly abundance of net sown area of 141.2 million hectares and total cropped area of 189.7 million hectares (1999-2000).
- *Seeds:* Seed is a critical and basic input for attaining higher crop yields and sustained growth in agricultural production. Distribution of assured quality seed is as critical as the production of such seeds. Unfortunately, good quality seeds are out of reach of the majority of farmers, especially small and marginal farmers mainly because of exorbitant prices of better seeds.
- *Manure and fertilizers:* Indian soils have been used for growing crops over thousands of years without caring much for replenishing. This has led to depletion and exhaustion of soils resulting in their low productivity. The average yields of almost all the crops are among the lowest in the world. This is a serious problem which can be solved by using more manures and fertilizers.



- *Irrigation:* Although India is the second largest irrigated country of the world after China, only one-third of the cropped area is under irrigation. Irrigation is the most important agricultural input in a tropical monsoon country like India where rainfall is uncertain, unreliable and erratic India cannot achieve sustained progress in agriculture unless and until

more than half of the cropped area is brought under assured irrigation.

- *Lack of mechanism:* In spite of the large scale mechanization of agriculture in some parts of the country, most of the agricultural operations in larger parts are carried on by human hand using simple and conventional tools and implements like wooden plough, sickle, etc.
- *Soil erosion:* Large tracts of fertile land suffer from soil erosion by wind and water. This area must be properly treated and restored to its original fertility.
- *Agricultural marketing:* Agricultural marketing still continues to be in a bad shape in rural India. In the absence of sound marketing facilities, the farmers have to depend upon local traders and middlemen for the disposal of their farm produce which is sold at throw-away price.
- *Scarcity of capital:* Agriculture is an important industry and like all other industries it also requires capital. The role of capital input is becoming more and more important with the advancement of farm technology. Since the agriculturists' capital is locked up in his lands and stocks, he is obliged to borrow money for stimulating the tempo of agricultural production.



- *Availability of required agricultural inputs including agricultural credit:* getting adequate agricultural inputs such as seeds, fertilizers, pesticides, and implements in time.
- *Transportation problems:* Lack of cheap, efficient means of transportation is a big problem widely seen in the Indian agriculture sector; small farmers still rely on bullock-carts for transporting their produce.
- *High-interest rates :* Thousands of farmers take their lives each year due to debt burden (having other indirect causes interlinked). Unreasonably-high interest rates should be declared illegal, and the government must take quick, strict, and appropriate action against greedy money lenders. Another problem is small and marginal farmers have to go through cumbersome procedures (that they are unaware of) to get institutional credit.
- *Government schemes not yet reaching the farmers:* In 2008, the government brought agricultural debt-waiver and debt-relief scheme in effect to benefit over 36 million farmers. The scheme also covered direct agricultural loan to stressed farmers.

integration. Section III presents the state-of-the-art in ploughing the soil and sowing the seeds. Section IV describes the implementation and working of the system. Section V concludes the paper.

III. PLOUGHING SOIL, SOWING SEEDS.

Ploughing loosens and mixes the soil. During ploughing, an adequate amount of air gets trapped in the pores of the loosened soil. Plant roots use this air to breathe. Plant roots can penetrate deeper in loose soil and thus hold the plant firmly. Loose soil is good for the growth of earthworms and microbes that provide nutrients to the soil and help in further loosening it. During ploughing, the nutrient-rich soil is brought to the top. Thus plants can absorb the nutrients more easily. Loose soil mixes well and uniformly with the added fertilizers.

Implements used for opening and loosening of the soil are known as ploughs. Ploughs are used for primary tillage. Ploughs are of three types: **wooden ploughs, iron or inversion ploughs and special purpose ploughs.** **Wooden plough or Indigenous plough.** Indigenous plough is an implement which is made of wood with an iron share point. It consists of body, shaft pole, share and handle. It is drawn with bullocks. It cuts a V shaped furrow and opens the soil but there is no inversion. Ploughing operation is also not perfect because some unploughed strip is always left between furrows. This is reduced by cross ploughing, but even then small squares remain unploughed.

- **Soil Turning Ploughs** :Soil turning ploughs are made of iron and drawn by a pair of bullocks or two depending on the type of soil. These are also drawn by tractors.
- **Mouldboard plough**: The parts of mouldboard plough are frog or body, mouldboard or wing, share, landside, connecting, rod, bracket and handle. This type of plough leaves no unploughed land as the furrow slices are cut clean and inverted to one side resulting in better pulverisation. The animal drawn mouldboard plough is small, ploughs to a depth of 15 cm, while two mouldboard ploughs which are bigger in size are attached to the tractor and ploughed to a depth of 25 to 30 cm. Mouldboard ploughs are used where soil inversion is necessary.



- **Disc plough**: The disc plough bears little resemblance to the common mouldboard plough. A large, revolving, concave steel disc replaces the share and the mouldboard. The disc turns the furrow slice to one side with a scooping action. The usual size of the disc is 60 cm in diameter and this turns a 35 to 30 cm furrow slice. The disc plough is more

suitable for land in which there is much fibrous growth of weeds as the disc cuts and incorporates the weeds. The disc plough works well in soils free from stones. No harrowing is necessary to break the clods of the upturned soil as in a mouldboard plough.

- **Chisel plough**: Chisel plough is used for breaking hard pans and for deep ploughing (60-70 cm) with less disturbance to the top layers. Its body is thin with replaceable cutting edge so as to have minimum disturbance to the top layers. It contains a replaceable share to shatter the lower layers.

Sowing seeds is a process of planting seeds into the soil. the different types of seed sowing are:

- **Traditional method**: A funnel-shaped tool is used to sow the seeds traditionally. The funnel is filled with seeds and the seeds pass through two or three pipes with sharp ends.



- **Broadcasting**: In this process, the seeds are scattered on the seed beds either mechanically or manually. In the broadcasting method of sowing, the seeds are spread uniformly and are then covered with planking. When there are a large number of seeds, the work is done using mechanical broadcasters. The seed rate is very high in this system.
- **Dibbling**: Holes are made in the seedbeds and the seeds are placed in it. The seedbeds are then covered. The holes are made at definite depths. A dibbler is used for dibbling. It is a conical instrument that makes proper holes in the seedbed. This method is usually used to sow vegetables.
- **Transplanting**: In this process, the seedlings are first planted in nurseries and then planted in the prepared fields. It is usually done to grow vegetables and flowers. A transplanter is used for the purpose. But, this process is time-consuming.
- **Hill dropping**: In this method of sowing, the selected seeds are dropped at regular spaces but not in a continuous manner.
- **Check row-planting**: The seeds are planted along straight parallel furrows. A check row planter is used for the method. The row-to-row and plant-to-plant distance is uniform.
- **Drilling**: The seeds are dropped into furrow lines in a continuous flow and are then covered with soil. This is done either mechanically or manually. The proper amount of seeds are sown at proper depths and proper spaces. Drilling can be done in the following ways.

III. BUDGET PLAN AND COMPONENT DISCRPTION

This section describes the money planning and the components description of every section . The mechanical aid that we proposed comprises of various sectors that work in sync with one another. Below is the mathematical calculation that defines our budget planning system.

S.no	Name of the component	Quantity	Unit price	Amount
1	Exchanger box	1	700	700
2	Seeding wheels	2	750	1500
3	Metal rods for wheels	12	90	1080
4	Connecting pipes	13	100	1300
5	Welding charges	-	4000	4420
6	Transportation charges	-	1500	1500
				TOTAL= 10,500/-

1. Handle → used for carrying or moving the vehicle.
2. Exchanger box → metal container. // used for storing seeds in it.
3. Seeding wheels → iron // For the moment of the vehicle.
4. Metal rods for wheels → Iron// giving grip for the moving wheels in the soil.
5. Connecting pipes →metal // for the passage of seeds from the box to the ground.
6. Welding charges → manual power // joining the pipes, box, handle with each other.
7. Transportation charges .



Figure 1: The final working model.

Talking of the above mentioned figure, it depicts a complete understanding of our . The primary actors that constitute the vehicle are:

- *Handle* : For our vehicle we have made use of a handle which is made of long metallic rod connected at the bottom of the vehicle and the other end is left

freely for the easy moving of the vehicle.

- *Seeding wheels* : There are two wheels present which gives a huge support for the vehicle to stand stable and, the main purpose of the wheels making with iron is that , iron is a strong object which can overcome and rocks present in the soil and move forward successfully. So, the wheels are with iron and it has the capacity to hold the weight of the total vehicle.
- *Metal rods for wheels*: We have given specific design for the wheels, that is small metal rods attached to the wheels while moving. This is done so because while moving the vehicle with the soft wheels there is a chance of sticking in middle because as the wheels are soft while moving, the wheels gets stucked to the mud or soil and becomes difficult to move, also needs more force and energy to the vehicle.
Attaching small metal rods to the wheels give a perfect to move in the soil. Because such type of design is proportional to friction for moving successfully in the soil.
- *Connecting pipes*: These are made with metal(hollow metal pipes) which is strong and rigid. This processing is like an intermediate between the container and the ground. This allows the successful passage of seeds flowing from top to bottom. As the container box is in the shape of cone, the flow of seeds is very easy to move from top to bottom. And this falling of seeds must be done simultaneously while moving the vehicle. Because there should not be a heap full drop of seeds at one place only. Falling of seeds must be done with single seed at a time.
- *Welding* : This is the mechanical work which is done by welders. The combining of metal to metal with heating them at particular temperature, by taking appropriate precautions.

V. IMPLEMENTATION & WORKING

In the previous section we discussed about the architecture and technical working related to the mechanical aid. In this section we talk about the implementation and working of the vehicle in a real world scenario. The complete process of moving or using the vehicle and the advantage of using this vehicle is explained clearly trough step by step process with the helping of real-time working pictures and explanation of the experience is explained with the help of the following fc.

The basic moving of the vehicle can is shown in a video:

<https://drive.google.com/drive/folders/1gTZ7CWaTtb9hUDFuOFDojpHcliuMtpuJ?usp=sharing>

This is a drive link , where we can see that farmer is happy with the product and he is using the product in his field.

This is the proof , through which we can say that this product works at its best for which it is made. That is ploughing of soil in a two sequential rows is successfully done, along with the simultaneous moment of the vehicle the dropping of the seeds from pipes is also done perfectly.

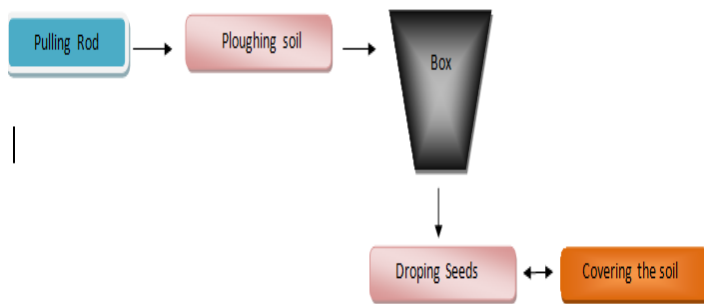


Figure 2: Flow chart of the system

We conducted an experiment in order to depict the working of our system at every stage from checking the ploughing of soil to sow seeds in the soil. This is done by implementing the mechanical working of the vehicle that is with the help of the wheels and the handle to move. And these are the steps that a farmer needs to follow in order to work using this mechanical aid:

- **Step 1:** Take the handle and keep moving the vehicle with the help of that handle.
- **Step 2:** While moving, see whether the sharp edges are ploughing the soil or not.
- **Step 3:** If there is a successive moment then there will be the passage of seeds from the box to the ground through the connecting pipes.
- **Step 4:** While moving, see whether the seeds are reaching the soil or not.
- **Step 5:** It covers the soil, after sowing seeds. So see whether the soil is covering successfully or not.
- **Step 6:** The user must repeat these steps for multiple times to plough the soil and sow the seeds successfully, through out the land (to complete the total agricultural land).

The above mentioned procedure for ploughing the soil and sowing the seeds is explained with the help of the following screenshots.



Figure 3: Moving the soil with the help of soil.

The above figure depicts that the farmer is moving the vehicle with the help of handle.



Figure 4: Ploughing the soil.

The above figure depicts the scenario of ploughing the soil with the help of the sharp edges.



Figure 5: Sowing the seeds.

The above figure depicts the scenario of sowing seeds in the soil through the connecting pipes.

RICULTURAL BASED SEED SOWING MACHINE F OR INTERCROP FIELDS

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