

# “DEVELOPMENT AND FABRICATION OF MULTIPURPOSE AGRICULTURAL VEHICLE”

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## ABSTRACT

*A Study has been carried out to develop multipurpose agricultural equipment, for performing major agricultural operations like, pesticide spraying, cultivation, cutting operations of sandy loam soils, to increase the efficiency and reduce the production and handling cost. Modifications were carried out, and the modification includes fabricating a vehicle which is small, compact in size which can move easily across the fields. This vehicle consists of various agricultural implements like inter-cultivator, pesticides sprayer, goods carrying container, which can be easily assembled and disassembled by a single person, the cost of equipment is less by 83% compared to a tractor and 40% compared to a tiller (price in India).*

*This model we made is totally made up of the mild steel. All the major purpose covered and components used for the prototype of this model are at the project level. It can be extended to the bigger level.*

**Keywords:** *Agricultural equipments, efficiency, modification, fabrication.*

## 1. INTRODUCTION:

India has always been known for its agricultural products and quality, plus it is one of the key drivers of Indian economy (almost 25 % in GDP in 2003-2004). In India almost 66% families do farm practices for the living. Now-a-days, by comparison we came to know that the production rate of Indian farms is less than the other nations. After studying the reasons behind the less production rate we got some points. 1. Less mechanization in the farms 2. Decreasing (small) size of farms. 3. Money problems.

From engineering point of view instead of changing the size or providing money we can surely provide more mechanization in the farm. Most of the farms in India are small scale and unorganized as compare to other nations hence we can't use machines which are useful in other nations. There is a scope for engineers to create a

machine which can deliver in these conditions with reduced price and number of operations. Our USP for this project is attachment-detachment model for accessories and accessories like harvesting, pesticide spraying and cultivating.

In the most parts of India the agricultural and rural development is depend upon the small farms. Most of the time, they are out of machinery which is specially designed for those farms. Due to this more human resources are used resulting in lesser productivity and costlier conditions. The most urgent need of India and neighbor countries is to feed the rapidly increasing population. With the help of proper farm mechanization we can achieve required food production in sustainable way by using land and labour efficiency in farm sector.

We are creating a **MULTI-PURPOSE AGRICULTURAL VEHICLE** which can perform many operations such as harvesting, pesticide spraying and cultivating.

## 2. LITERATURE SURVEY

The conclusion from the paper was need of multifunctional single axel vehicle for pre and post harvesting .We have taken this as base for our research and further production of our multifunctional agricultural vehicle [1]. Study on farm mechanization in west Bengal as being part of India it give clear status about availability and progress in India. This ensured us to-do some better [2]. With help of this paper we were able to derive our attention to broader way also how attachments can be used for making a model which is efficient and used in more sustainable way [3].

## 3. COMPONENT

### 3.1 SOLAR PANEL:

Solar Panel Connected To The Battery And Battery Connected To The DC Motors. Solar panel provides the charging and it is stored in to the battery. When battery charged by the solar panel it will provide the energy to the DC motors. Battery provides the energy to the DC motor is controlled by the switch.



Fig- 1: Solar panel & its specification

### 3.2 SPRAY PUMP:

DC motor is connected to the gear box via pulley-belt arrangement. Gear box output speed reduces but torque increases. By the crank shaft arrangement the circular motion is converted in to the reciprocating arrangement.

Pumping start and it will pump the sprayer.

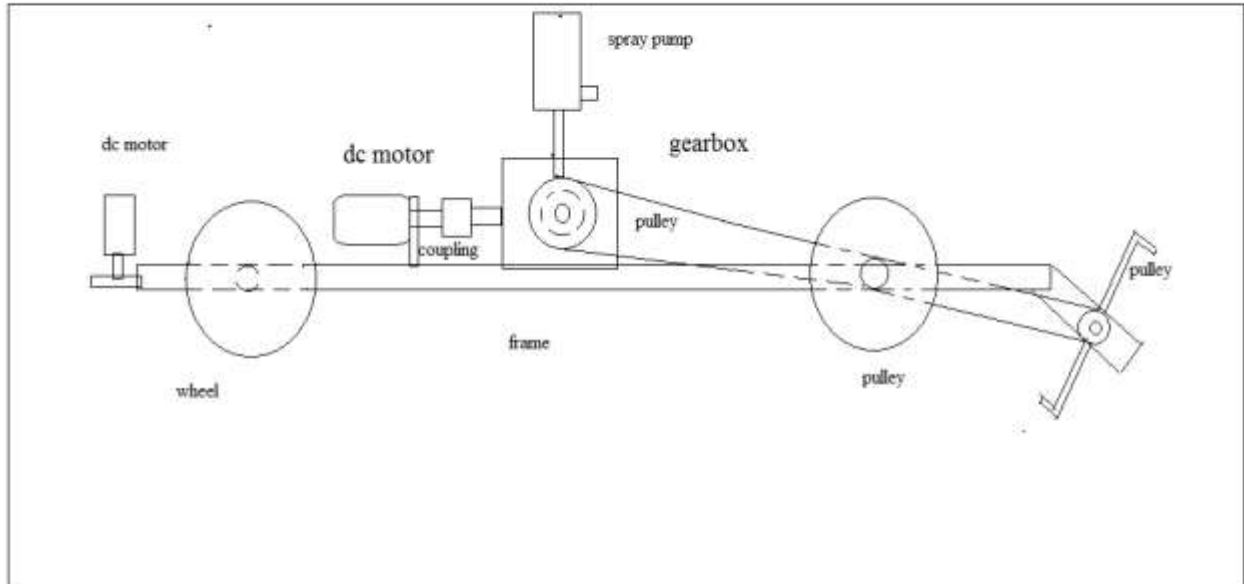
### 3.3 HARVESTING PRINCIPLE:

When DC motor rotates, motion transfer to the crank shaft arrangement will reciprocate the blade. Blade will cut the grass in front of it.

### 3.4 ROTARY ARRANGEMENT:

DC motor is connected to the gear box via pulley-belt arrangement. Gear box output speed reduces but torque increases. Gear box is connected to the rotary arrangement with the higher torque.

## BLOCK DIAGRAM



**Fig-2:** Block diagram of project

### OPERATING PROCEDURE:

1. Switch ON the system
2. Vehicle automatically starts
3. All the assembly of three operations can be dissemble easily.
4. That means three functions are run by the dc motor
5. Gear box is connected to increase or complete the torque requirement of the concern operation.
6. Solar panel charges the battery and it is utilized by the DC motor used in it.

#### 4. DESIGN SPECIFICATIONS

Solar panel = 10 watt.

Battery = 12v

##### 4.1 TORQUE OF GEAR BOX:

**Reducer Torque =  $9550 \times \text{Motor Power (Kw)} / \text{Input Speed of rated power's motor} \times \text{Ratio} \times \text{Service factor}$**

Motor power: voltage x current

Motor power: 12 volt x 3 amp

Motor power: 36 watt

Motor power: 0.036 kilo watt

Motor speed: 1000 rpm

Ratio of gear box: 20:1

Reducer Torque= $9550 \times 0.036 / 1000 \times 20 \times 1.3$

Reducer Torque=8.9388 N-M

##### Actual Project Model:



**Fig-3:** Actual Setup

#### 5. CONCLUSION

This multipurpose system gives an advance method for many operations like cut the crops with minimum man power and labor making it an efficient vehicle. The machine will do the multiple operations the farm by considering particular rows and specific column at fixed distance depending on crop.

Multipurpose machine makes easy to operate different operations in this project, we have made different assemblies for each operations and it is quite having low maintenance and stable system.

Multipurpose equipment is designed and fabricated with low-cost, easy to use and effective equipment for agriculture.

- Crop cutting is given a simultaneous operating area, thus time saving and reduces human efforts effectively.
- By providing a balanced mechanism for various objectives in a single machine signifies the technological improvement in agricultural sector.
- Single equipment performing more objectives with flexibility in changing the operation will motivate the farmers.

### 5.1 ADVANTAGES

1. Different features in one module.
2. Solar operated.
3. Battery operated.
4. Can be used for cultivating, harvesting, spray Pump.
5. Easy to maintain.
6. Low-cost machine

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