

DESIGN AND FABRICATION OF MULTIPURPOSE AGRICULTURAL EQUIPMENTS

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Abstract – Generally cultivation of any crop involves various steps like seed selection, field preparation, fertilizing, sowing, irrigation, germination, thinning and filling, weed removal vegetative stage, flowering stage, pesticide spraying, fruit or pod formation stage, harvesting and threshing. Farmer has to use various agricultural equipment and labors for caring out those steps, our purpose is to combine all the individual tools to provide farmers with multipurpose equipment which implements all the scientific farming techniques and specifications and suitable for all type of seed to seed cultivation with as minimum cost as possible. This project work is focused on the design and fabrication of multipurpose equipment which is used for land preparation, sowing, fertilizing, leveling and weed removal process. The multi-crop planter has the capability of delivering the seeds precisely with uniform depth in the furrow, and also with uniform spacing between the seeds. The seed planter consist of the main frame, adjustable handle, seed hopper, seed metering disc, adjustable furrow opener, adjustable furrow closer, drive wheels, seed tube. Seed metering disc was designed to interchangeable to allow for sowing of the different varieties of seeds. The multipurpose agricultural equipment is very simple to use, the various adjustments are made with ease, and it is maintenance free

tools are used in land preparation, for sowing of seeds, weeding and harvesting. Modern agricultural techniques and equipment are not used by small land holders because these equipment are too expensive and difficult to acquire. By adopting scientific farming methods we can get maximum yield and good quality crops which can save a farmer from going bankrupt but majority of farmers still uses primitive method of farming techniques due to lack of knowledge or lack of investment for utilizing modern equipment. The use of hand tools for land cultivation is still predominant in India because tractors require resources that many Indian farmers do not have easy access to. The need for agricultural mechanization in India must therefore be assessed with a deeper understanding of the small holder farmer's activities. There is huge gap in technology adoption and Implement used with small and marginal farmers. Sustainable improvement in the livelihoods of poor farmers in developing countries depends largely on the adoption of improved resource conserving cropping systems. While most of the necessary components already exist, information on the availability and performance of equipment is lacking and effective communication between farmers and agricultural research and development department is unsuccessful

Key Words: fertilizers, mechanism, weeds, agriculture

1. INTRODUCTION

Agriculture has been the backbone of the Indian economy and it will continue to remain so for a long time. A man without food for three days will quarrel, for a week will fight and for a month or so will die. Agriculture is a branch of applied science. Agriculture is the science and art of farming including cultivating the soil, producing crops and raising livestock. It is the most important enterprise in the world. Over the years, agricultural practices have been carried out by small-holders cultivating between 2 to 3 hectare, using human labor and traditional tools such as wooden plough, yoke, leveler, harrow, mallot, spade, big sickle etc. These

1.1 Farm Mechanization

1.Ensure timely field operations to increase productivity, reduce crop losses and improve quality of agro produce.

2.Increase land utilization and efficiency

3.Increase in labor productivity using labor saving and drudgery reducing device besides, being cost effective and eco-friendly. Appropriate machinery have been adapted by farmers for ensuring timely field operations and effective application of various crop production inputs utilizing human, animal and mechanical power sources.

2. Objective of Our Project

The purpose of this project is to provide farmer with multipurpose equipment which implements all the scientific farming specifications and technology to get maximum yield and good quality crops by reducing investment and number of labor. There are many tractor powered equipment which are suitable and economical only for more than 5 acres of land. There are many hand pulled equipment which are only suitable for gardening purpose. Our objective of making animal powered equipment is suitable for 1 acre to 3 acres of land it is both economical and modernized with scientific methods. Majority of the Indian formers are the land owners of 1 to 3 acres. Hence it is most suitable for Indian economy and farming techniques

2.1 Factors That Influenced Design And Fabrication Of Our Equipment

- Scientific farming methods
- Precision farming
- Acceptance for all types of seed to seed farming
- Fool proofing
- Portability of the equipment: our equipment is flexible for easy assembly and disassembly.
- Low cost

Generally cultivation of any crop involves various steps like seed selection, field preparation, fertilizing, sowing, irrigation, germination, thinning and filling, weed removal, vegetative stage, flowering stage, pesticide spraying, fruit or pod formation stage, harvesting and threshing. Farmer has to use various agricultural equipment and labors for caring out those steps, our purpose is to combine all the individual tools to form a multipurpose equipment which reduces the overall equipment cost and labor cost and also increases the yield of the crop by implementing scientific farming method.

Initially plough is connected to the beam using fasteners and tilling of the soil is performed, later during sowing seed drill is attached to the beam along with leveler for leveling of soil for sowing and fertilizing, the seed and fertilizer are stored in the primary seed and fertilizer box. The seeds and fertilizer are provide to the secondary seed box to maintain the level of seeds in the box and the disc picks up the seeds from the seed hopper and fertilizer hopper and drop them to the furrow through the seed tube. When the seed is dropped at a specific distance then seed covering device covers soil over the seed and after germination of seed takes place, weeds are also developed in the field. By replacing the seed

drill by weeding tools for the same beam arrangement we can use it for weeding purposes. Weeding blade is attached in inclined position such that it uproots the weeds and simultaneously weedicide is applied on the field by the weedicide container attachment

3. METHODOLOGY ADOPTED FOR THE PROJECT

3.1 Seed Cum Fertilizer Drill

Seed drills, fitted with fertilizer dropping attachment, distribute the fertilizer uniformly on the ground. They deliver both the seeds and fertilizers simultaneously in an acceptable pattern. Seed cum fertilizer drill has a large seed box which is divided lengthwise into two compartments, one for seed and another for fertilizers distribution. It is called seed cum fertilizer drill. Such a drill has a large seed box which is dividend lengthwise into two compartments, one for seed and another for fertilizers. Seed drill may be classified as

1. Bullock drawn
2. Tractor drawn

3.2 Functions Of A Seed Cum Fertilizer Drill:

Seed cum fertilizer drill performs the following functions

- To carry the seeds and fertilizer in separate compartments.
- To open furrows at uniform depths To meter the seeds and fertilizers
- To deposit the seed and fertilizer in the furrows in an acceptable pattern
- To cover the seed and fertilizer and compact the soil around the seed.

3.4 Components Of Seed Cum Fertilizer Drill.

A seed drill with mechanical seed metering device mainly consists of:

a) Frame

The frame is usually made of mild steel angle section and flats. It is strong enough to With stand all types of loads in working condition. All other parts of a seed drill are fitted to the frame

b) Seed box

It is a box like structure made up of either mild steel or galvanized iron and provided with a lid. In some designs a small agitator is provided at the bottom of the box which agitates the seeds while the drill in operation and prevents clogging of seeds. Seed metering mechanism is placed at the bottom of the box.

c) Fertilizer box

It is a box made up of either mild steel or galvanized iron which contains fertilizer in it

d) Seed metering mechanism

The mechanism which picks up seeds from the seed box and delivers them in to the seed tube is called seed metering mechanism. Seed metering mechanism may be of several types: (a) Fluted feed type (b) Internal double run type (c) Cup feed type (d) Cell feed type (e) Brush feed type (f) Auger feed type (g) Picker wheel type and (h) Star wheel type. Usually seed metering mechanism is provided at the bottom of the box.

e) Drive transmission system

The drive transmission mechanism consists of a wheel, sprocket-chain assembly and a driven shaft that carry the seed picking discs. When the seed drill moves in the field, the drive wheel rotates due to its contact with soil and the sprocket wheel also rotates. The chain connecting the drive wheel sprocket and driven wheel sprocket rotates the shaft carrying the seed metering discs.

4 Working

Generally cultivation of any crop involves various steps like seed selection, field preparation, fertilizing, sowing, irrigation, germination, thinning and filling, weed removal, vegetative stage, flowering stage, pesticide spraying, fruit or pod formation stage, harvesting and threshing. Farmer has to use various agricultural equipment and labors for carrying out those steps, our purpose is to combine all the individual tools to form a multipurpose equipment which reduces the overall equipment cost and labor cost and also increases the yield of the crop by implementing scientific farming method. Initially plough is connected to the beam using fasteners and tilling of the soil performed, later during sowing seed drill is attached to the beam along with leveler for leveling of soil for sowing and fertilizing, the seed and fertilizer are stored in the primary seed and fertilizer box. The seeds and

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5 CONCLUSIONS

Practically our multipurpose agricultural equipment can be used for tilling, fertilizing, sowing, leveling and also used for weed removal purposes. All the parts are connected in such a way that in every stage of agriculture the equipment can be rearranged or easily assembled with fasteners to required length and specifications of field operation. Our team has successfully combined many ideas from various fields of mechanical engineering and agricultural knowledge to improve the yield and by reducing the labor effort and expenses. The whole idea of multipurpose equipment is a new concept, patentable and can be successfully implemented in real life situations

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