DESIGN AND FABRICATION OF MULTIPURPOSE AGRICULTURAL EQUIPMENT

PROJECT REFERENCE NO: 40S_BE_1364

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Keywords:
Multipurpose agricultural equipment, Ploughing, leveling, sowing, fertilizing, weeding, weedicide applying, scientific farming.

Introduction:
Agriculture has been the backbone of the Indian economy and it will continue to remain so for a long time. It has to support almost 17 percent of world population from 2.3 percent of world geographical area and 4.2 percent of world’s water resources. 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 sikle etc. These tools are used in land preparation, for sowing of seeds, weeding and harvesting. Modem agricultural techniques and equipments are not used by small land holders because these equipments 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 use primitive method of farming techniques due to lack of knowledge or lack of investment for utilizing modern equipment. 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.

Objectives:
- The purpose of this project is to provide farmers 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.
- Multitasking, in one assembly of the equipment it performs sowing, fertilizing and leveling. In another assembly it performs weeding and weedicide application.
- Automated, the equipment can be animal powered or tractor powered just pulling of the equipment is enough and rest of the actions are automated.
- The Successful implement of scientific farming with our equipment will lead to higher yield and better quality of crop.
- Applicable for all type of seed to seed cultivation.
• Sequential spacing of seeds will reduce the wastage of seeds and helps in the best utilization of the field and reduces the thinning and filling effort.
• Number of workers required is reduced excessively, which in turn reduces labor charges.
• Variable with dimensions and farming specifications
• Adopted scientific farming and Precision forming technology.
• Our equipment is completely flexible for easy assembly and disassembly.

Methodology:
a. **Materials used:** mild steel L-angles, flat plates, hollow cylinders, sheet metal, PVC discs, wooden discs, TVS fasteners.
b. Work details: complete design and fabrication Metal cutting, grinding, drilling, welding, wood cutting.
c. Working: 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.

Results and conclusion:
Practically our multipurpose agricultural equipment can be used for ploughing, 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 implement in real life situations.

**Scope for future work:**

By increasing the equipment strength and quality to its peak, we can have multipurpose agricultural equipment for life time usage.

By providing hydraulics, gear arrangements and some minor adjustments the equipment can also be made as tractor powered equipment.