Development of Working Model of Fertilizer Feeder for Paddy Field

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Abstract— The report presents theoretical studies and field experiments regarding mechanical equipment for sowing small fertilizer seeds in paddy (Rice) field, highlighting the advantages of this type of equipment with superior parameters regarding time consumption are obtained from the considered crops. Equipment can be used in narrower spaces, being easily to handle and use. By this equipment we conclude that the productivity is increased and the time consumption is reduced. It is said that on many farms, production suffers because of improper seedbed preparation and delayed throwing of fertilizer, harvesting and threshing. Mechanization enables the conservation of inputs through precision in metering ensuring better distribution, reducing quantity needed for better response and prevention of losses or wastage of inputs applied. Mechanization reduces unit cost of production through higher productivity and input conservation. This project consists of a mechanical hopper, rotary feeder, pair of sprockets, chain and a chassis body to mount this equipment. This mechanical injection system is used for increasing productivity, reducing cost and time consumption with lowering the human effort.

Key words: Fertilizer Feeder for Paddy Field

I. INTRODUCTION

The seed feeding is the important stage in the agriculture field. The design of fertilizer sowing agro equipment machine will help Indian farmers in rural side and small farm. It will reduce the cost of seed feeding and will help to increase economic standard of an Indian farmer. Our invention is low cost fertilizer sowing machine that is designed around readily available parts. The parts are available locally, so they can manufacture and repaired in the community without depending on imported goods. Now a days there is no machine available which helps our farmer to sowing the fertilizer preservative seeds, so they choose manual method for sowing fertilizer. They pick one by one preservative seed and buried them inside the mud. This manual method comes with many disadvantages like it consume more time and also creates back pain problems to the farmer etc. Our fertilizer sowing machine is novel because it solves problem in an efficient, affordable and practical way.

II. LITERATURE REVIEW

A. Laukik P. Raut, Nitin Y. Mohite, [2013],

This paper present study about Mechanization which reduces unit cost of production through higher productivity and input conservation. Farmers are using the same methods and equipment for the ages. In our country farming is done by traditional way, besides that there is large development of industrial and service sector as compared to that of agriculture. The spraying is traditionally done by labor carrying backpack type sprayer which requires more human effort. The weeding is the generally done with the help of Bulls which becomes costly for farmers having small farming land. So to overcome these above two problems a machine is developed which will be beneficial to the farmer for the spraying fertilizer and weeding operations.

B. Varikuti Vasantha Rao, Sharanakumar Mathapati, Dr. Basavaraj Amarapur, [2013],

This paper presents the design and implementation of multiple power supplied fertilizer sprayer. The proposed system is the modified model of the two-stroke petrol engine powered sprayer which minimizes the difficulties of the existing power sprayer such as operating cost, changing of fuel etc. The two-stroke petrol engine has been replaced by a direct current motor and operated by the electrical energy stored in the battery attached to the unit. The battery can be charged by solar panel during the presence of sun. This system can be used for spraying pesticides, fungicides, fertilizers and paints.

C. A. R Kyada, D. B Patel, [2014],

This paper discussed the basic requirements for small scale cropping machines. They should be suitable for small farms, simple in design and technology and versatile for use in different farm operations. A manually operated template row planter was designed and developed to improve the planting efficiency and reduce drudgery involved in manual planting method. Seed planting is also possible for different size of seed at variable depth and space between two seed. Also, it increases the seed planting, seed/fertilizer placement accuracies. It was made of durable and cheap material affordable for the small-scale peasant farmers. The operating, adjusting and maintaining principles were made simple for effective handling by unskilled operators.

D. Dhanesh D. Patil, Dr. Mangesh G. Phate, [2016],

This paper studied production of rice and onion, which is gradually a major production crop in kokan. The rice should be dropped at a regular interval. But the existing equipment does not fulfill these criteria in India. In this system there is no need to drop the rice plant more than one time and no wastage of costly rice plants. And we save the production cost as well as cultivation time, labor cost and get more yields.

E. Abdul Rehman, Mangesh Koli, Umesh Kori,[2017],

The project consists of better design of the machine which can be used specially for sowing of soya beans, maize, pigeon, Bengal gram, groundnuts, etc. The process of crop production depends on timely seeding of these crops with reduced dull work of farm labor. The robotic system play an immerse role in all sections of societies, organization and industrial units. The objective of the project is to develop a microcontroller-based system it helps in on farm

operation like seeding and fertilizing at predesigned distance and depth with all applicable agriculture.

III. METHODOLOGY

The basic aim of this project is to develop a Fertilizer feeder machine for paddy field, which is used for digging the soil, Fertilizer sowing, and Furrow to close the mud with minimum cost. This whole system works with the Chain and sprocket mechanism with manual efforts. The base frame is made for providing support and motion to the assembly with 3 wheels connected. Funnel is made by the sheet metal, to store the Fertilizer. The fertilizer flow through the funnel to the guide pipe connected with the Furrow arrangement. The furrow is fitted with supporting frame at bottom side to dig the soil and inject the fertilizer in soil with suitable depth. Thus the maximum efficiency is utilized from the Operator and transfer to the system through chain and sprocket arrangement.

A. Selection of CHAIN DRIVE

I=1,
ANSI Chain number = 40
Pitch distance = 12.7 mm
Sprocket diameter D=60 mm
Number of Tooth = 18
Roller diameter d1= 7.9 mm
Width w= 4 mm
Chain length=641.925mm

B. Material and Dimension of FRAME:

Chassis – MS pipe : 550*350*405mm-
Thickness -35 mm

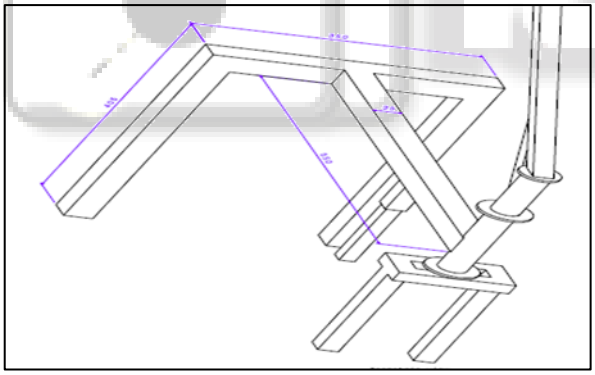


Fig. 1: Supporting Frame

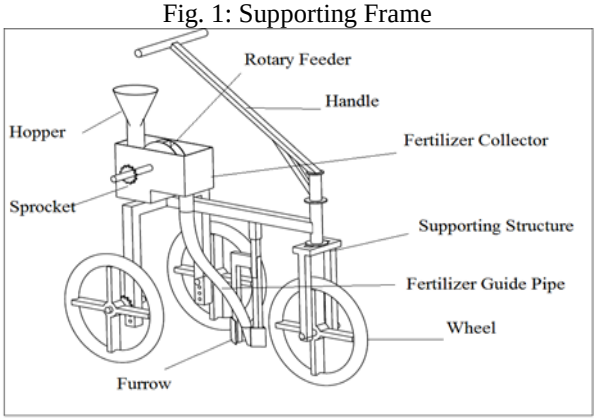
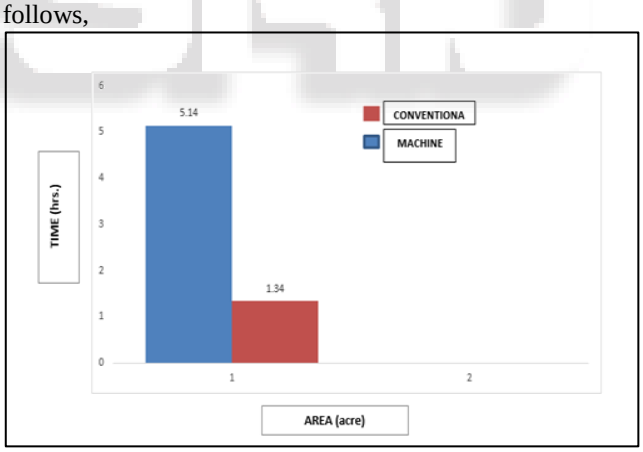


Fig. 2: System Layout

IV. RESULTS

- The actual field testing of system were conducted on considered area of 1Acre and the results are as follows:
- Time required for fertilizing the selected area by Conventional (Manual) method = 5 Hrs. 14 Min.
- Time required for fertilizing the selected area by using working model of Fertilizer Feeder = 1 Hrs. 34 Min.
- So, Time saved by our working model for selected area is 3Hrs. 40 min.

Graphical representation of results area as follows,



V. ADVANTAGES

- It was made of durable and cheap material affordable
- Lesser maintenance cost.
- Long life.
- Provide proper compaction over the seed.
- Reduce the workload on the farmer and as it is easier to operate.
- Excess consumption of fertilizer is reduced.
- Improvement in planting efficiency. Increase in crop yield and cropping reliability.

VI. LIMITATION

- Speed is less because of jamming of wheels due to mud.
- Corrosion problem of metal parts due to contact with water.
- Complex connections
- Due to low capacity of Hopper refilling is time consuming.

VII. CONCLUSION

The fertilizers are feed in proper manner or sequence which results in proper germination of seeds. This automated way of feeding fertilizer reduces the labor requirement as well as human efforts. Previously we opted conventional (manual) method for feeding the fertilizer which leads us to excessive consumption of fertilizer thus, to overcome this problem we find an automated way of feeding the fertilizer which reduces this excessive consumption of fertilizer. After field testing we conclude that time required for feeding fertilizer and labor intensity is reduced while the productivity is increases as compared to old conventional method.

VIII. FUTURE SCOPE

- System can be used for various type of yields after some modification.
- By providing remote control mechanism need of operator is reduced.
- To complete large amount of work in less time.
- Increasing Hopper capacity time consumption is reduced and productivity increases.
- Providing attachment of cultivator, weeder instead of furrow system can be used for various application.
- To increase the efficiency, the solar power is used instead of manpower by providing Solar panel, Electric motor the Power output can be increased.
- We are looking this project as revolution in small farms in India, which is most uncovered area in this sector is cost and more efficient way.

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