



Design and Fabrication of Solar Broadcaster and Weeder

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ABSTRACT: Greenhouse gas emission from transportation is one of the major environmental issues and its emission rate is increasing at faster rate by petrol/ diesel engine. Also Nowadays the Increasing fuel price would have a devastating impact on the transportation Sector. So adopting solar power machinery/vehicle can solve this problem. Sowing small seeds is operated manually by small-scale farmers which normally results in poor distribution of the planted seeds. In a bit to solve the problems associated with manual seed broadcasting, an affordable manually operated seed broadcaster has been design and constructed. Breakage efficiency increases with the decrease in size of seeds broadcasting while discharge efficiency increase with increase in the size of seed broadcasted. The device provides leverage in lifting the agriculture productivity in the area of quick broadcasting. ICAR. “If more crops and locations are included, the losses may be much greater than what is currently estimated”. The proper weed management could bring down these losses substantially. The hand weeding is expensive due to less availability of Agriculture labours. In order to minimizing the losses Improved methods for weed management are considered some of the most pressing needs in crop production. The machinery offers a possibility of controlling weeds precisely, particularly for weeds grow near or within crop rows. The has two weeder dryland peg weeder and cono weeder. So it is used for removing weeds in vegetable gardens and paddy. The weeder is the equipment that can be fixed and removed easily to the machinery.

KEYWORDS: Solar Operated, Manual seed broadcaster, loss minimizing, weeder

I.INTRODUCTION

Various types of machines can be used to plant seed in the soil. There are variations in sizes and shapes of different crops. Some are small like those of millet, some are medium size for instance sorghum, wheat and some are relatively large e.g. maize, groundnut etc. The recommended method of growing each crop also varies. For example, yam, maize and cotton are grown in ridges, while wheat and barley are best cultivated on flat. Some crops are grown from seeds; some are reproduced by planting cuttings from the stem of pruning crop, for example, cassava and sugarcane. Some crops like rice and vegetable could be planted directly in the field or raised up in a nursery bed before transplanting. Various type of papers has been reviewed on Solar powered weeder from this we lead to gap analysis that one wheeler solar powered weeder is more satisfying and cheaper than those chemical and other conventional weeders. Thus the problem definition of the project is controlling the weeds in the agriculture field. Also the labour required for weeding is expensive, time consuming and difficult to organize, while the main objective is to build a machine that will overcome the above bottlenecks. In this project we are going to prepare a weed removing machine for agricultural land and to reduce the human effort of weed elimination weed elimination and to create a machine for low cost using solar energy. Later model design and fabrication will be done.

II.LITERATURE REVIEW

They developed analytical models for on-spinner particle motion and found reasonable agreement between their models and experimental measurements of the radial and total velocities of steel ball bearings leaving the spinner plate as well as the angle between where particles are dropped and where they leave the spinner plate.



VARSHNEY *et al.*, (1967) “DEVELOPED A HAND OPERATED CENTRIFUGAL BROADCASTER”[1] suitable for Indian conditions based on the imported broadcaster from USA. The results showed similarity in distribution pattern in some of the seeds due to same similar physical property. The recent studies on injector-type applicator showed that the push-type applicator significantly reduced the labour requirement to 15– 20 h/ha compared to the injector-type applicator or hand placement (Abdul Wohab *et al.*, 2017). Applying fertilizer evenly can reduce crop input costs and dramatically improve crop yields and performance (Anonymous 2016). The present study was undertaken with the specific objective to develop a broadcaster with variable rate technology.

Relevance to current Research

Tajuddin (1989) designed, DEVELOPED AND TESTED A HAND ROTARY-BROADCASTING DEVICE[2] for broadcasting seeds, fertilizers and granular insecticides in laboratory and field. The uniformity co-efficient of distribution was determined for spreading urea using the broadcasting device and compared with that of the hand broadcasting process.

The device’s coverage was 1.26 ha/hr in paddy. The unit had a weight of 3.6 kg and cost of US\$ 55 and average Uniformity Coefficient of Distribution was 50 % (Tajuddin, 1989)

Relevance to current Research

DESIGN AND DEVELOPMENT OF TEFF SEED BROADCASTER by “Abdulhakim Shukurea Rahmato & Dr. Ing Zewdu Abdi”, Lecturer, School of Mechanical and Industrial Engineering, Bahir Dar University, Bahir Dar, Ethiopia.[3] The performance of spinner spreaders has been widely investigated. Studies have typically focused on analytical models for particle trajectories on and off of the spinner and design of spinner disc for fertilizer. Several experimental studies have also been performed, but these often utilize idealized particles, typically steel ball bearings, or a limited number of granular fertilizer.

Relevance to current Research

A REVIEW PAPER ON SOLAR ENERGY SYSTEM by “Deepak Purohit, Goverdhan Singh”, Udit Mamodiya Poornima College of Engineering, Jaipur. [4]When a suitable light of certain frequency (i.e. $E=h\nu$ energy of light depends on its frequency) is fall on a special metal like silicon, electrons get some energy of suitable frequency which is greater than work function [work function is minimum energy required by an electron to emit from metal surface. So there is no photoelectric emission possible below work function ($w \leq E$) and emit from the conduction band and come out from metal surface. Like that other electron come out and form a big unit of charge flow which is responsible for electric current.

Relevance to current Research

UTILIZATION OF SOLAR ENERGY IN AGRICULTURE MACHINERY ENGINEERING by “M. Imtiaz Hussain and Gwi Hyum Lee”, Department of bio systems engineering, Kangwon National University, Chuncheon, South Korea (2010). [5] The various solar energy collecting system have been developed and analysed for agriculture applications. They include solar thermal and electric devices such as solar crop dryers, solar water pumps, solar greenhouse heating, ventilation for livestock, solar aeration pumps, solar electricity, and many more.

III.METHODOLOGY OF PROPOSED SURVEY

The seed broadcasting machine comprises of supporting frame, a hopper, motors, bearings, spreading disc, seed cover (quick shut-off device) and shaft. It also consists of a motor which provide a rotating motion to the broadcasting disc through the help of gear arrangement on the shaft. The broadcasting process takes place on the broadcasting disc. The seed fed into the hopper which houses the seeds, moves from inclined position of the hopper and flow by gravity.



Control of the seed flow is achieved by the quick shut-off device which is located directly between the base of the hopper and broadcasting disc. The major function of the quick shutoff is to control and regulate the flow of seeds which is very essential in achieving broadcasting. While the hand crank transmits a rotating power through the massing of bevel gears, the gears in turn provide a revolving motion to the broadcasting disc thereby spreading the seeds on ground or already prepared soil that is ploughed and harrowed the orthographic and the sectional views of the broadcasting machine.

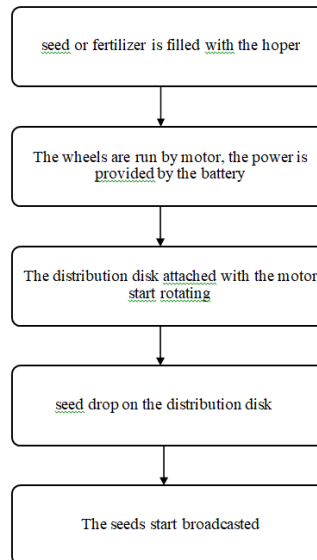


Figure.1 Methodology of Solar broadcaster

Hopper

Hopper is used to keep seeds or fertilizer. Hopper is used for convey the fertilizer to the rotating disc. Cross section of the hopper is circular.



Figure.2 Designed hopper

Spinning disc and vane

Seed which pass through hopper and reached the disc with 1 m diameter and made of mild steel flat sheet metal with 5 mm thickens and also four straight vanes are attached on disc and the length of each vane is 50 mm, 5 mm thickness, 40 mm width, 40 mm height and made of mild steel flat sheet metal as shown the fig.



Figure.3 Disc and vane assembly

Solar panel

Photovoltaic solar panels absorb sunlight as a source of energy to generate electricity. A photovoltaic (PV) module is a packaged connected assembly of typically 6x10 photovoltaic solar cells. Photovoltaic modules constitute the photovoltaic array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications. The most common application of solar energy collection outside agriculture is solar water heating systems.



Figure.4 Solar panel 12V

IV.CONCLUSION AND FUTURE WORK

Developing of mathematical model design of different machine parts, the project of A manual operated solar broadcaster and weeder machine has been analysed, evaluated and designed. Based on the machine parameters, the projected distance of seed as well as the point where seed leave the disc was changed due to change of the rotational speed of disc. Evaluation of the machine by three seeds (paddy, guinea corn and soya bean). Breakage efficiency increased with a decrease in size of seeds broadcasted while discharge efficiency increased with an increase in the size of seeds broadcasted. (Broken and discharged efficiencies of the device varied between 2.7% to 10% and 91.7% to 97.5% respectively for the various seeds broadcasted).



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