Modification of Seed Drilling Machine

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Abstract— *The seed drill machine is a sowing device that precisely positions seeds in the soil and then covers them. The seed drill sows the seeds at equal distance and proper depth. This ensures that seeds also get covered with by the soil. This saves them from being eaten by birds & erosion of soil. The use of a seed drill can improve the ratio of crop yield by as much as nine times. In short seed drill can be described as a modern agricultural implement used for sowing seeds.*

Keywords— Seeds, Blowing, Hoper

I. INTRODUCTION

Under intensive cropping, timeliness of operations is one of the most important factor which can only be achieved if appropriate use of agricultural machines is advocated (Salokhe and Oida, 2003). With the present day advanced agronomic practices, seed genetics and on- farm technology to deliver optimal yield while using fewer resources, precision planting is not out of place. Manual method of seed planting, results in low seed placement, spacing efficiencies and serious back ache for the farmer which limits the size of field that can be planted. Hand-pushed and Transnational Journal of Science and Technology August 2012 edition vol. 2, No.728 tractor mounted row seeders (usually single and multiple row) normally requires a well prepared seed-bed which may be ridged or flat bed. In the past, various types of design have been developed with different design approaches which have theiradvantages and disadvantages and also operation a limitations.

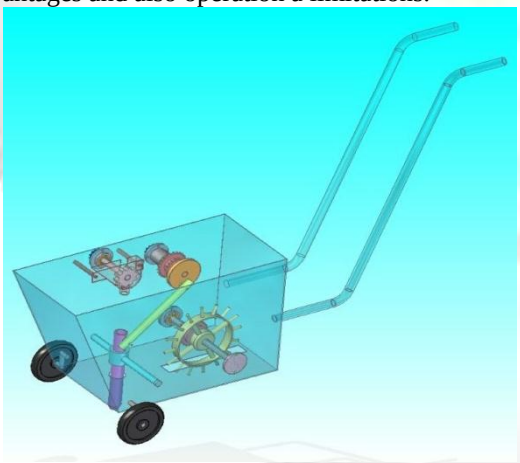

Fig-1: CAD model

Adisa(1980)designed and constructed a manually operated flute planter/fertilizer distributor which was found to be 94% efficient in seed spacing but could not be used on the ridged seed bed and requires quite some effort and time to change seed drill size and seed spacing. Also Braide and Njidda (1989) developed a combined jab planter which was found to be 73.4% efficient and was three times faster than manual planting with hoes and cutlass. Abubakar (1987) made used of the principle of jab planter in applying fertilizers. Adekoya and Buchele (1987) developed a cam activated precision punch planter which was capable of planting an untilled soil. Braide and Ahmadu (1990) developed a transplanter for some selected crops in Guinea Savannah of Nigeria which has 0.19ha/h field capacity and 20% field efficiency. All of the above designs were reported to have got quite promising results.

A hand held seed planter includes a tubular body and a pair of ground-opening jaws pivotally carried on one end of the body. A seed hopper is slid ably mounted on the other end of the body and a ground engaging collar is carried on the one end, surrounding the jaws and mounted for sliding movement on the tubular body. When the soil collar is placed on the ground and a downward force applied to the handle attached to the hopper, the jaws are moved downward into the soil and create a seed opening in the soil. Adjustable pins on the collar control the depth of the opening. At the same time, a seed scoop recess, carrying a seed, is brought into alignment with an opening in a tube which extends through the hopper. A seed is then transferred into the tube, passing through the tubular body and between the jaws, to be planted in the seed opening. In one embodiment of the invention, the jaws are operated by upward movement of the soil collar, while in another embodiment, the jaws are operated by rollers carried on an internal jaw actuating tube which contacts cams formed in the inside surfaces of the jaws.

A system and method are disclosed for the planting of a seed tape. The system includes a frame conjured for coupling to a tractor, a furrow opening device attached to the frame, and a furrow closing device attached to the frame. In one embedment, a seed tape guide assembly is attached to the frame and has a tamping arm for guiding the seed tape. In another embodiment, a seed tape Wheel is attached to the frame by a mounting arm and positioned Within at least a portion of the furrow opening device. The mounting arm is biased by a biasing member and the seed tape Wheel is forcibly pressed by the mounting arm into contact With the furrow.

A seed delivery system for use in a seeding machine that removes seed from a seed meter by capturing seed there from. The delivery system moves seed down to a lower discharge point and accelerates seed horizontally rearward to a speed Approximately equal to the forward travel speed of themachine such that the seed, when discharged has a low or Zero horizontal velocity relative to the ground. The delivery system uses a brush belt to capture, move and accelerate the seed. By capturing the seed and moving it from the meter to thedischarge, each seed is held in place relative to other seeds and the planter row unit. As a result, the seeds are isolated from row unit dynamics thereby maintaining seed spacing.

The most common seed delivery system may be categorized as a gravity drop system. In the case of the gravity drop system, a seed tube has an inlet end which is positioned below the seed metering system. The simulated seeds fromthe seed metering system merely drop into the seed tube and fail via gravitational force from a discharge

end thereof into the seed trench. The seed tube may have a rearward curvature to reduce bouncing of the seed as it strikes the bottom of the seed trench and to impart a horizontal velocity to the seed in order to reduce the relative velocity between the seed and the ground. Undesirable variation in resultant in-ground seed spacing can be attributed to differences in how individualseeds exit the metering system and drop through the seed tube. The spacing variation is exacerbated by higher travel speeds through the field which amplies the dynamic field conditions. Further seed spacing variations are caused by theInherent relative velocity difference between the seeds and the soil as the seeding machine travels through a field.

II. OBJECTIVE

The basic objective of sowing operation is to put the seed and fertilizer in rows at desired depth and seed to seed spacing, cover the seeds with soil and provide proper compaction over the seed. The recommended row to row spacing seed rate, seed to seed spacing and depth of seed placement vary from crop to crop and for different agro-climate conditions to achieve optimum yields.

III. FACTOR AFFECTING OF SEED BLOWING

Mechanical factors, which affect seed blowing

1) Uniformity of depth of placement of seed.
2) Uniformity of distribution of seed along rows.
3) Transverse displacement of seed from the row.
4) Prevention of loose soil getting under the seed.
5) Degree of soil compaction above the seed.
6) Uniformity of soil cover over the seed.
7) Mixing of fertilizer with seed during placement in the furrow.

IV. SELECTION OF SEED AND PLANTING SPACE

Different designs of improved seed drills/planters have been developed for sowing of crops. Basic difference in the design of these seed drills is mainly in the type of seed metering mechanism and furrow openers. Therefore, it is essential to select the machine with a metering unit and furrow opener suitable for the crop and soil conditions.

Fig. 2: Plant spacing.

1) For small seeds like rapeseed-mustard seed drill or planter with vertical roller with cells, inclined seed plate with cells or small grooved fluted roller metering system is recommended.
2) For medium seeds such as wheat, soybean, safflower and linseed, seed drills with Standard fluted rollers are recommended.
3) For bold seeds like groundnut and castor planters with inclined cell plate or cup feed type metering system are recommended.

Furrow openers should be selected according to type of soil and depth of seed placement.

1) For trashy, stony and light to medium soils, shovel type openers are used. The depth of seed placement from 50 to 100 mm is achieved with these openers.
2) Small shoe or shovel type openers are also used for shallow (20 to 50 mm deep) Placement of seeds in dry farming areas.
3) Shoe type openers with single or twin boots are used for sowing in heavy and medium soils for seed placement at 20 to 7Omm depth.
4) Runner type opener is widely used for placement of seeds at shallow depth where soil disturbance required is minimum. Soil cover over seed is also minimal.
5) Covering chains and wooden planks are widely used to cover and compact the soil over seeds in the furrows and level the fields after sowing operation.

Seed Name	Diameter(mm.)
Arugula	2.5
Beet	7.5
Broccoli	3.5
Cabbage	3.5
Carrot	3.5
Cauliflower	3.5
Corn	13.5
Cucumber	9
Lettuce	6
Okra	7.5
Onion	6
Pea	10
Radish	4
Sun flower	2.5

Table 1: Diameter of different seed.

Vegetable	Distance between rows(cm)	Distance between plants(cm)	Planting depth (cm)
Asparagus	100	30	2.5-4
Beet	45-60	3-5	1.5
Broccoli	60-75	45-60	0.5-1.5
Cabbage	60-75	45	0.5-1.5
Carrot	45-60	3-5	1.5
Cauliflower	60-75	45-60	0.5-1.5
Corn	75-90	15-25	2.5
Okra	60	30	2.5
Onion	45-60	5-8	1.5-3
Pepper	60	60	1.5
Potato	75-60	25-30	10
Radish	30	2.5	1.2
Tomato	90	90	1.2
Watermelon	120-180	30-60	2-3
Kale	70	60	0.5
Leek	60	1.5	1.2
Lettuce	45-60	30	0.5-1

Table 2: Detail of planting seed

V. DEVELOPMENT OF MACHINE

A. Agricultural Mechanization Development

Efficient machinery helps in increasing productivity by about 30% besides, enabling the farmers to raise a second crop making the agriculture attractive. Raising more crops with high productivity is a path for meeting the future food

requirement of population. Development and introduction of high capacity, precision, reliable and energy efficient equipment is the need for judicious use inputs. For crop production human, animal and mechanical energy is extensively used. In small and marginal farms, except for tillage, other operations such as sowing/ transplanting, weeding, cotton picking harvesting and threshing (paddy) are normally manually performed Mechanization also imparts capacity to the farmers to carry out farm operations, with ease and freedom from drudgery, making the farming agreeable vocation for educated youth as well. It helps the farmers to achieve timeliness and precisely meter and apply costly input for better efficacy and efficiency.

1) Seed Metering Device

Metering mechanism is the heart of sawing machine and its function is to distribute seeds uniformly at the desired application rates. In planters it also controls seed spacing's in a row. A seed drill or planter may be required to drop the seed rates varying across wide range. Common type of metering devices used on seed drills and planters are.

B. Planter Seed Metering Component

Seed metering devices are those devices that meter the seed from the seed box and deposit it into the delivery system that conveys the seed for placement on or in the seedbed. The types of seed metering devices and their functional and operational requirements are discussed below.

Functional requirements of seed metering devices:

- Meter the seed at a predetermined rate/output (e.g. kg/ha or seeds/meter of row length).
- Meter the seed with the required accuracy (spacing) to meet the planting Pattern requirements.
- Cause minimal damage to the seed during the metering process.

C. Operational Requirements of Seed Metering Devices:

- The ability to meter the range of seed types to be planted by the machine.
- The ability to meter these seeds over the range of seeding rates required to meet individual crop and/or particular environmental conditions.
- The ability to maintain the predetermined rate (output) and spacing (accuracy) over the range of conditions likely to exist at planting.
- A high level of operational reliability, which is important in view of the generally narrow planting window available.

In addition, the size of the seed box or boxes, the ease of filling and emptying these boxes, and the ease of calibrating, cleaning and adjusting the seed metering rate must all be considered as all affect the overall performance and efficiency of the planting operation.

VI. POWER TRANSMISSION SYSTEM

A. Gear Sprocket Transmission System for Speed Variation:

Speed variation can be done by the gear sprocket transmission system. The speed variation is used for the variable distance between the two plants. Speed variation which is given to the cam which gives variable distance. The gear ratio will be set as according to required distance between the plants.

Fig. 3: Gear

B. Chain Sprocket for Power Transmission:

A chain is a reliable machine component, which transmits power by means of tensile forces, and is used primarily for power transmission and conveyance systems. The function and uses of chain are similar to a belt. There are many kinds of chain. It is convenient to sort types of chain by either material of composition or method of construction.

We can sort chains into five types.

- Cast iron chain.
- Cast steel chain.
- Forged chain.
- Steel chain.3
- Plastic chain.

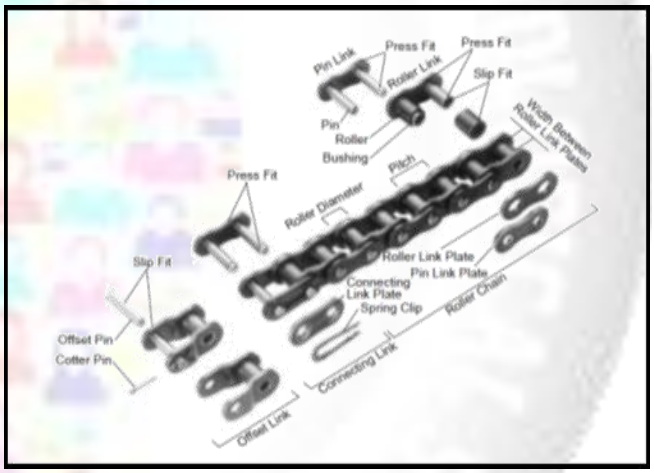

Fig. 4: Chain

VII. ADVANTAGES

1) Improvement in planting efficiency.
2) Increase in crop yield and cropping reliability.
3) Increase in cropping frequency.
4) It increased seed planting.
5) Seed/fertilizer placement accuracies.
6) It was made of durable and cheap material affordable for the small scale peasant farmers.
7) Lesser maintenance cost.
8) The seed can be placed at any required depth.
9) The plant germination can be improved.
10) Requirement of labour also decreased.
11) It consume less time for sowing.
12) Seed can be placed uniformly in a row with required distance between plants.
13) Labour cost can also be reduced.
14) Provide proper compaction over the seed.

VIII. PROTOTYPE

We have done a prototype model of this project. In this prototype model we have used M.S. sheet, gear, sprocket, chain, hollow pipe, hopper, M.S. shaft. The seed drilling machine is made body of prototype is M.S. sheet, handle is made by hollow pipe, shaft is made by solid pipe, chain is used iron material. The prototype model is shown in fig.

Fig. 7: Prototype

IX. ANALYSIS

A. *Wheel*

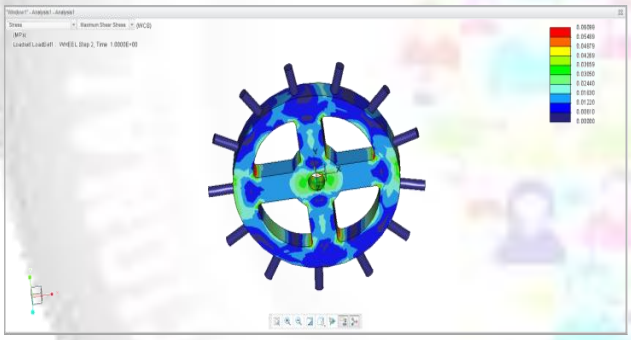

Fig. 8: Wheel

- Force applied: 50N in the –ve x direction
- Maximum sheer stress is been calculated as: 06 Mpa
- Material assigned: mild steel of young modulus: 2.9e psi
- Poisson ratio: 0.27

B. *Wheel Shaft*

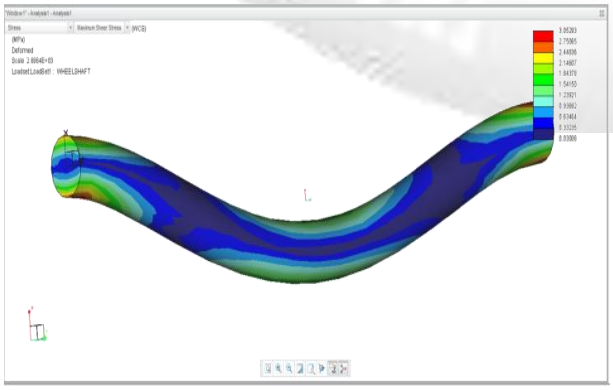

Fig. 9: Wheel shaft

- Force applied: 200N in the –ve x direction
- Maximum sheer stress is been calculated as: 06 Mpa
- Material assigned: mild steel of young modulus: 2.9e psi
- Poisson ratio: 0.27

C. *Flang*

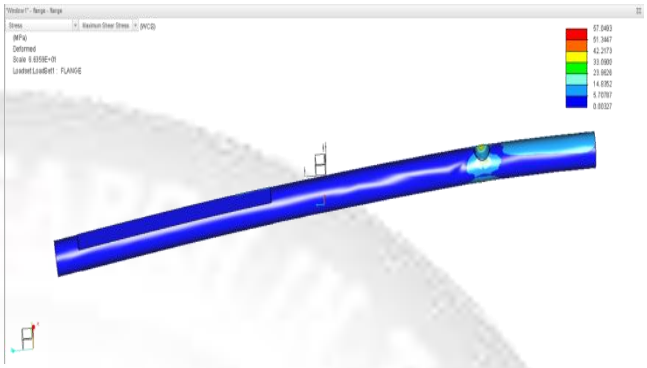

Fig. 10: Flang

- Force applied : 50N in the –ve x direction
- Maximum sheer stress is been calculated as :06 Mpa
- Material assigned : mild steel of young modulus :2.9e psi
- Poisson ratio : 0.27

X. CONCLUSION

These seed drill have considerable potential to greatly increase productivity in South Asia, and other countries of the world where the two wheel tractor is the main traction unit in farming. The main task now is to promote this technology and have these drills readily available to farmers at an affordable price. The tyned drill can be readily made from local components in most workshops. Most of the steel for fabrication is simple in design, and types can be made from old automotive leaf springs. The only specialized items required are the seed meters, which can be sourced at an inexpensive price from a Chinese manufacturer or local promoter. There is now a machine seed drill readily available for manufacture by others. It is hoped that it will be at an affordable price.

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