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Development of proximity distance sensor based electronic metering mechanism for three rows planter

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ABSTRACT

Correspondence to: V.V. AWARE Department of Farm Machinery and Power, College of Agrilcultural Engineering and Technology, Dr. B.S. Konkan Krishi Vidyapeeth Dapoli, RATNAGIRI (M.S.) INDIA A newly developed electronic metering mechanism was introduced in 3 rows planter. 18 hp garden tractor was used as a power source. Three rows inclined plate planter consisted of hoppers, frame, ground wheel and power transmission system as main components. Electronic metering mechanism consisted of proximity distance sensor, ground wheel plate, 12 V DC battery, 12 V,42 rpm DC motor, cell plate etc. as major components. Groove size on the cell plate was designed using spatial dimensions of cowpea seed. Metering mechanism was designed considering cowpea plant to plant spacing as 12 to 13 cm. As per design the theoretical plant to plat spacing for cowpea seed was 12.58 cm, number of cells on the cell plate were 10 and the number of fingers on the ground wheel plate were 7 having width as 1.3 cm. The newly developed electronic planter was tested in the laboratory. The average spacing plant to plant spacing for the three rows was 12.35 cm. It was necessary to maintain tractor speed constant for getting the plant-to-plant spacing as per design.

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s the agriculture symbolizes the need of the human Abeings while electronic symbolizes the speed therefore electronics is useful for rapid production of the agriculture produce. Generally for sowing, drilling practice is adopted. The main drawback of drilling is the seed rate and spacing between seeds cannot be controlled which causes hindrance to mechanized intercultural operation. Due to planting the specific spacing between two plants can be maintained which provides sufficient space for proper growth of the individual plant and hence yields more production per unit area. Now a days more stress is given on check row planting in which distance between two seeds along the row as well as distance between two rows can be maintained constant. The main advantage of the check row planting is that the intercultivation operations can be done in either direction. The fluted wheel is used as the metering mechanism on seed drills in which seed rate cannot be controlled easily. On planter vertical plate, horizantle plate, inclined plate or spoon type metering mechanism is for metering seeds in which individual seed can be metered accurately.

The planters are designed with certain objectives and should meter the seed accurately. It should open then furrow to proper depth, should place the seed at desired depth, should cover the soil on seeds and it should provide favourable conditions for germination of seeds. The ultimate aim being to obtain maximum net return per hectare.

Garcia *et al.* (1997) studied computer-based seeding rate controller, using sensors for detecting the seeds dropped from the hopper and the traveling speed and a personal computer to control the seed metering mechanism using pulse width modulation. Benneweis *et al.* (1993) implemented monitor/controller systems for planters and seeders by connecting the sensors and actuators directly to a console unit mounted in the tractor. The Seed Spider Company (2000) manufactured and patented the first electronic seed metering mechanism. The electronic metering mechanism can also be employed effectively on bullock drawn planter also. An electronically controlled check valve is put in such case, which facilitates the precision planting of seeds.

The electronic metering mechanism has following advantages

- Check row planting is possible with the help of electronic metering mechanism,
- Accuracy is higher,
- By making small adjustments, these metering mechanism can be used for various seeds and
- It requires less maintenance.

METHODOLOGY

The study included the details of the construction and performance evaluation of the electronic components used in metering mechanism. It was developed at College