

## **A Four-Row Plot Grass Drill With V-Belts and Flexi-Planters<sup>1</sup>**

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Numerous plot and field scale planters have been developed during the past two decades. Most have been constructed for specific planting situations, consequently they are generally restricted to a limiting set of conditions and require further modification or complete alteration to be useful under other circumstances.

Because of the wide research interest and diversity of crops, soils, seedbed conditions, and planting specifications, by far the largest number of plot drills are for planting

cultivated crop varieties. While descriptions have appeared regularly in agronomic research periodicals, the more recent references include those by Poehlman (1962), Rivers and Beachell (1963), Smith and Bergen (1962), and Vogel, Peterson, and Allan (1963). None appears to be completely satisfactory for seeding native grasses.

Although several grass planters have been developed for field scale plantings or at least for large plots (Barmington, 1957; Davis and Barmington, 1957; Hunt, Hulburt, and Wagner, 1963; Hyder, et al., 1961; and Schumacher, 1964), apparently none yet contains all the features essential for a plot-scale grass drill.

For grass plot seeding in a prepared mulch seedbed, the planting mechanisms should be the double-disc furrow opener type with depth bands to insure shallow seed placement and with spring-loaded press wheels to close the furrow and firm the soil near the seed. The diameter of the seed spouts must be large enough to prevent bridging and clogging by grass seed with feathery floral appendages or by other pieces of plant material. For expediency in plot seeding and controlled seeding rate, the seed distribution mechanism should be practically self-clean-

ing and not require recalibration with each change in species or seeding rate. Furthermore, there should be a wide range of gear ratios for varying plot lengths. Finally, to be useful in more than one locality, the unit should be easy to transport and convenient for power attachment.

The planter described here meets all those requirements and has the added feature of being made almost entirely of commercially available parts. Construction of the planter, therefore, is largely a matter of assembling stock items, rather than manufacturing unavailable components. Parts lists, sources of materials, approximate costs, and construction details are available upon request from the Fort Hays Branch, Kansas Agricultural Experiment Station, Hays, Kansas.

The basic framework of the drill is a John Deere<sup>2</sup> double tool bar with spacers acting as a rigid chassis for attachment of drill parts (Fig. 1). Four John Deere flexi-planters with double-disc furrow openers, shallow depth bands, and spring-loaded press wheels, but without

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<sup>2</sup>The use of trade names implies no endorsement nor criticism of the products or of similar products not named.

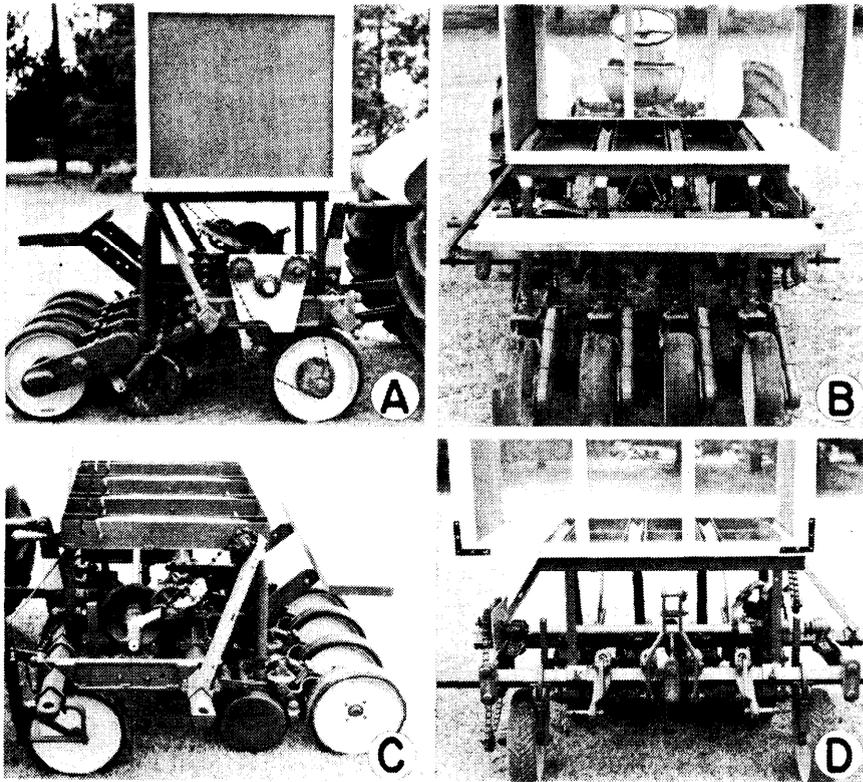


FIGURE 1. Four-row plot grass drill, (A) right, (B) back, (C) left, and (D) front.

seed hoppers, are attached to the rear bar at one-foot spacings. Two 16-inch gauge wheels, one with a hub and drive gear added, are fastened to the front bar. Mounted directly above both bars and supported at four points by angle iron legs and clamps is a frame assembly containing a seed distributing V-belt for each flexi-planter. Fertilizer-type tubes extend from the rear of the V-belt frame to the corresponding seed spout openings in the flexi-planters.

The V-belt power train consists of a chain leading from the drive-wheel sprocket to a transverse shaft and drive reversing assembly. The transverse shaft transmits power through an International Harvester cone-gear selector, with 10 gear settings, via chain to a drive shaft running through the V-belt rear pulleys. The cone-gear settings adjust V-belt travel to plots varying from 15 to 65 feet long by virtue of combination of 4-inch diameter sprockets on the drive wheel and transverse shaft, and 3-inch diameter sprockets on the output side of the cone-gear selector and V-belt drive shaft. Planting shorter plots is accomplished by distributing the seed on a shorter belt segment or by using a

larger drive-wheel sprocket. Using a smaller drive-wheel sprocket permits one to plant plot lengths greater than 65 feet without stopping to refill the V-belts. Maximum plot length may be limited in some instances by the amount of seed that can be placed on the V-belts for a single row.

A seat is supported at a comfortable height for one or two seed distributors. Passenger weight is carried by the tractor and gauge wheels and not by the planters or packers. The assembled planter, weighing 1,150 pounds, is easily attached to most small series tractors by 3-point hook-up. Turn space is limited to the turning radius of the power unit. The unmounted drill, with gauge wheels removed, fits conveniently into the bed of a ½-ton pickup for transport.

Wind becomes a major hazard when planting light, chaffy seed structures. This problem has been reduced satisfactorily by protective shielding beneath and a hood over the V-belt frame. Top, front, and side panels offer adequate wind protection in velocities up to 20 MPH. At higher velocities it is necessary to extend the top and side panels and anchor a drop curtain back of

the seed distributing crew. A transparent front panel permits light to enter and allows the tractor operator to observe the progress of seed distribution on the V-belts and thus anticipate the signal to move through the plot.

Many light grass seeds have a varying tendency to adhere to the rubber V-belts. This is aggravated by an electrostatic charge on the belts and may be overcome by periodically sprinkling dry soil on the surfaces. Unprocessed, awned or bristled seeds that tend to cling together will drop more uniformly if a thin covering of fine soil is spread over the seed after it has been placed on the V-belts. The most tenaciously cohering seed structures can be forced through the planter seed spouts by reciprocating agitation with 3/16-inch diameter push rods extending the full length of the seed spouts and operated by the seed distributing crew.

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