A FERTILIZER PLACEMENT SEEDER FOR HORTICULTURAL CROPS

A machine to place precise amounts of fertilizer a definite distance from the seed was required to study the relationship between fertility and horticultural crop production. Machines for this purpose have been described previously (1, 2, 3). The position of the fertilizer applicators described here can be adjusted quickly and precisely when seeding experimental plots that require use of numerous fertilizer-seed space relationships.

Description

The planting and fertilizer mechanisms are mounted in the mid-section of a self-propelled tool carrier (Fig. 1A). A 24-hp gasoline engine drives the wheels via a hydrostatic transmission giving infinitely variable speeds up to 13 km/hr. The carrier is equipped with two hydraulically controlled tool bars.

Fig. 1. A, The horticultural seeder fertilizer placement machine with belt-type seeders installed; B, fertilizer placement adjustment mechanism; C, fertilizer depth control mechanism; D, soil stirrers and herbicide applicators.

Contribution No. 134 from Engineering Research Service, Research Branch, Canada Department of Agriculture, Ottawa.

The fertilizer application mechanism (Fig. 2) is fastened to the tool bar near the front of the machine. The fertilizer flow is from a belt-type hopper (A) with three 2,500-g capacity compartments which keep pure forms of fertilizer separated while loading (Fig. 3). The flow continues through a splitter box (B) which divides each sample into two equal parts, and then to collectors (C) which combine the split samples from each compartment for equal application to each side of the seed row. From the collectors, the fertilizer flows through flexible tubes (D) to deep applicators (E) clamped in staggered positions to a round tool bar (F) which allows them to swivel and slide (Fig. 1B). Reaction bars (G) attached to the applicator shanks fit into notches 5 cm apart on a member (H) parallel to the round bar. To adjust the position of the applicators, the clamps are loosened and the applicator slid to the desired position. For depth positioning, the depth is set at preselected positions on the quadrant of a hydraulic depth-control valve (Fig. 1C).

The fertilizer hoppers are of the false-bottomed belt type with travelling hoppers running on ball-bearing slides (J). As the hopper is driven forward by a sprocket-and-chain drive (K), it pulls with it the endless belt running on rollers 50 cm apart. As the hopper moves forward, the fertilizer falls from compartments over the front pulley and into the splitter box (B). Because the bottom and sides of the hopper move together, there is no drag on the fertilizer. The hoppers are protected from the wind by acrylic sides and vinyl
covers with loading slits at the top. The hopper drive is from a land wheel via a sprocket which can be selected to change row lengths. A ratchet mechanism is incorporated to prevent over-travel of the hoppers, and a hand wheel is used to return them to the loading position.

The commercial vegetable planter units (model 185, International Harvester Co., Hamilton, Ontario) were selected because of the wide variety of seed plates available and because of their adaptability to belt or cone dispensers for seeds which are impractical to plant with plates. Each of the three planter units mounted on the second tool bar is self contained and adjustable for row width. Seed spacing within the row is obtained by selection of the proper drive gear and seed plate.

A compressor, belt-driven by the engine, and an air storage tank are used to spray liquid insecticides, herbicides or fertilizer just behind the fertilizer applicators. Soil stirrers are attached to the front of the planters to erase any furrows left by the fertilizer applicators and to incorporate the herbicides or insecticides (Fig. 1D).

Performance
The completed machine had the following specifications:
- Three rows 4.6, 9.2 or 18.3 cm long
- Space between rows 0.45 to 0.76 m
- Seeding depth 1.35 to 7.0 cm
- Seed spacing determined by seed plate and gears selected
- Fertilizer 0 to 7,500 g/row, using a mixture of three types
- Fertilizer placement 0 to 15 cm each side of row and 0 to 20 cm below ground.

The machine was used during the 1967 season at Indian Head, Saskatchewan. The fertilizer dispensers were satisfactory for metering and divid-
ing each of the three samples for equal application on each side of the seed row, providing the fertilizer was spread uniformly along the belts. The calculations and gear changes necessary with hopper-type dispensers were eliminated since the rate of application was controlled by the quantity of fertilizer placed on the belt.

The fertilizer placement apparatus was convenient to locate at the desired position in relation to seed rows. Fertilizer was confined within a 2.5-cm² band at heavy rates. Two operators were required, one to load the seeding and fertilizing units and the other to drive.


Received June 20, 1968.

A COMPARATOR FOR COLOR GRADING OF PROCESSING TOMATOES

The use of flesh color as a criterion for determining grades of processing tomatoes has been long established. Originally, grades were specified in government regulations and/or legal contracts by the use of terms such as “well colored” or “moderately well colored,” and interpretation involved a great deal of discretion and wisdom on the part of those responsible for enforcing them.

Recently, electronic instruments capable of measuring one or more aspects of color have been developed or adapted to the specific purpose of measuring the color reflected by the flesh of tomatoes cut equatorially. One of the most widely accepted instruments is the Agtron model E (Magnuson Engineers Inc., San José, California) (1, 2).

1Contribution No. 236.