

The Studying On Drum-type Hill-drop Unit

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Abstract

The drum-type hill-drop unit, an important working device of the plastic-film-covered hill planter, can finish filling and separating seed precisely, perforating film and holing, and its seeding depth and spacing are stability. The unit is applied to hole seed many crops, for example, cotton, corn, soybean, etc.

Key words: Plastic-film-covered, Drum-type hill-drop unit, Hill planter.

The drum-type hill-drop unit(DHU) , the key work unit to the plastic-film-covered planter , mainly consists of distributor box , seeding parts, hole forming unit and drum . It can be operated to accomplish seeds distributing , hole forming , plastic film perforating. Moreover, its inner cavity can be used as seed box.

1. The structure and principles of DHU

As the figures shows , hole forming unit and distributor box (inner wall) are riveted with the corrugated sheets to form the seeding parts monomers , which distribute evenly and form DHU combined with the two covers , in the one of them seed entrance is made . For one structure type , seeds enter the entrance through the transport pipe ; for another structure type , to seed entrance, movable door is installed and can supply seeds directly . Hole forming unit consists of movable spout and fixed spout . When it works , hill-drop unit rolls forward, distributor box will fill seeds when it goes through seed pile , and when hill-drop unit to the top(this distributor box is seperated from seed pile) , the seeds carried by distributor box are in unsteady state, so they will fill into seed cavity . In the course of rotation , the fixed amount of seeds in the distributor box are excelled into hole forming unit , then hole forming unit is in closing-state. When the hole forming unit rotates and contacts with the ground , plastic film is perforated , and a hole is also made , at the same time, the flank of the movable spout rotates aversely to a degree by the reaction force of the ground, the holes forming unit is opened , the

seeds inside fall into the holes. Each seeding parts monomer in the drum accomplishes seeds excelling , plastic film perforating ,and hole forming work sequently in the course of rolling . The spacing of the hole forming unit detemines the plant spacing.

2. Experimental materials and methods .

2.1 Experimental condition

To ensure the field experiments and attain accurate data , a piece of experimental plot(80x30m)was chosen and tilled by shareplough.

The plot belongs to sandy soil ,the deterimented average moister rate was 18.24%.

2.2 Experimental implements and materials

The small 4-wheel tractor(11 kw) ,plastic film planter,plastic film , seeds and measure tools.

2.3 Experimental method

This research was designed as one factor trial (the work unit speed was the main factor) to examine the effect of the work unit speed on the steadility , the hole shape , plastic film hole size , seeds depth, plant spacing and other work performance indices.

The test before experiment enabled the assembling unit in work technical state , avoided the influence of wheel track and other factors. The middle group(total 3 group) was used to collect samples , DHU as the research target. The work unit travelled 60m in different speeds , the middle 50m was chosen as the effective range and in this course the data were collected.

3. Experimental results

The field experimental results were showed as follow : seedind work unit (seeding width 1200mm ,3 rows) ; maximum speed :7.5km/h ; when work speed was <7.2km/h , vacancy hole rate :2% , seed hole qualified rate(2-4 grandules per cavity) :74.5% ; when work speed was<5 km/h ;vacancy cavity rate :1.25% ,seed hole qualified rate:81.5% .

Through one fact trail and experimental result analysis , it was concluded that the factor of speed was not significant to seeding depth, plant spacing or the size of plastic film holes , but obviously significant to the hole planting numbers , when the speed increased, both one seed rate and vaccancy hole rate increased , the coefficient of variation of hole planting numbers was also increased.

4. Conclusion

Drum-type hill-drop unit is currently a good work unit part of the plastic-film-covered planter, suitable to the sowing of corn, cotton, soybean and other crops. The optimum parameters design of distributor box can realize the hill-drop planting and supply seeds, distribute and excel reliably, and not injury seeds , keep constant sowing depth and plant

spacing. When the radius of drum is over 200 mm, critical work speed can reach 8km/h.

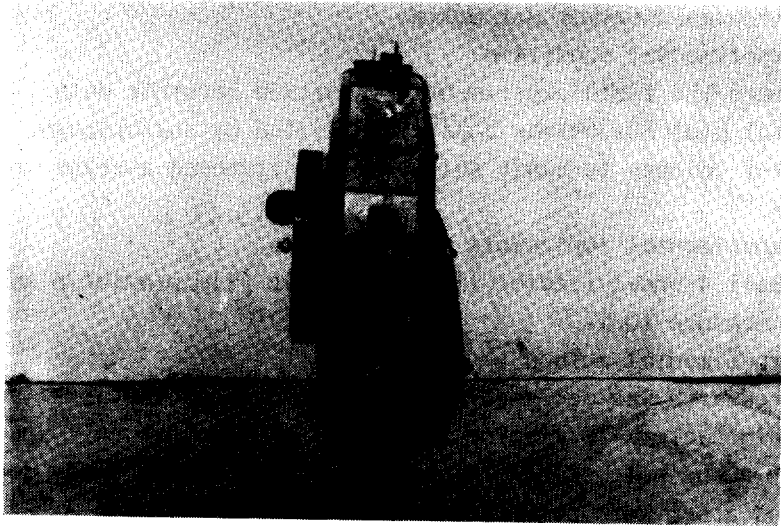


fig: Drum-type hill-drop unit

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