

Development of a drill equipped with two-layer fertilizer applicator for maize and its effects on field test¹

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summary

The objective of this study was to develop a machine with which sowing and dressing two-layer fertilizers on both sides of a sowing furrow could be done simultaneously. One side of the sowing furrow was to place fertilizers in a depth of 5-8 cm to provide the nutrients for early growth of maize. Concurrently the other side of sowing furrow was to plow out tillage pan or hard pan and the fertilizers were placed in the depth of 20-25 cm to supply the nutrition for middle and later growth of the plant.

A drill with four rows of sowing equipped with two-layer fertilizer applicator for maize was developed at our station in 1987. The sowing mechanism was remodeled from Ta-hsun drill. To prevent missing hills from poor conveyance, a ground-driven wheel was devised to drive the seed belt through chain and gear drivfor sowing seeds. The fertilizer applicator consist of fertilizer box, opener and driving mechanism. Ascrew conveyor was installed at the bottom of a fertilizer box. The fertilizers applied at shallow and deep strip placement were forced to drop out at the ends of the screw conveyor by screwing. The rates of fertilizers could be adjusted by number of pitches, inner diameter of a screw and number of driving gears. The subsoiling plow was used for plowing out tillage pan or hard pan and deep strip placement of fertilizers. The disc furrow opener was used for shallow strip placement of fertilizers. A set of ground-driven wheel was designed to drive two sets of fertilizer boxes and seed boxes for reducing resistance of driving. The operations of furrowing sowing, dressing, and soil mulching were satisfactory after field testing of the developed machine.

For testing the effects of the machine utilization, field observation was carried out at Chian and Fenglin in the fall crop of 1986 and spring crop of 1987. The results showed that the total amount of fertilizers (Compound fertilizer 39,500 kg/ha + compound 1,400 kg/ha) required for maize when applied as basal dressing by utilizing the machine could facilitate the early growth of maize, promote the early appearance of tassels and increase the yields of kernels by 9-16%, due to the incresement of ear length and ear weight.

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