A Mechanical Planter for Hardwood Cuttings

W. H. Cram
Retired Superintendent, Tree Nursery, P.F.R.A., Indian Head, Saskatchewan

A tractor-drawn mechanical planter designed for planting hardwood cuttings is described. Detailed plans are available.

From 1980 to 1961, an average of 450,000 unrooted hardwood cuttings of poplar were produced and distributed annually by the Indian Head nursery for farm shelterbelt plantings in the three prairie provinces. During this period, rooted cuttings were produced only for nursery stooling beds or clonal tests. These rooted cuttings were produced using hand tools. However, in 1961 most shelterbelt plantings of unrooted cuttings failed because of severe drought conditions. Hence, the development of nursery planters was initiated in 1962 to produce rooted cuttings for large-scale distribution.

The first prototype planter (fig. 1), which utilized a mechanical planter or dibble, was developed in 1963. The prototype had a chisel to make a planting trench for 10-inch (25-cm) cuttings planted with 2 inches (5 cm) of the cutting above ground level, as subsequently proposed by McKnight (4). In addition, seats for two operators, with conveniently located, portable cutting boxes and two rubber-tired rear packing wheels, were copied from the Dunlop tree planter described by Cram (2). This tractor-drawn machine materially increased the speed of planting cuttings in nurseries, but cuttings were often damaged by the plunger and rooting was reduced.

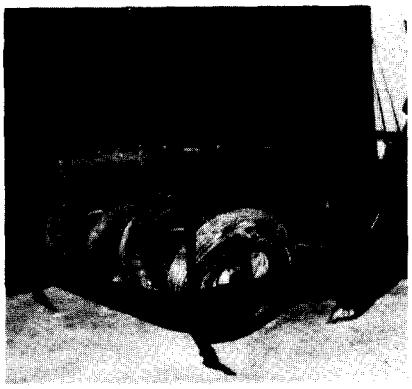

Figure 1.—*Two-row mechanical dibble cutting planter—1963.*

An original planting mechanism was designed, developed, and modified from 1964 to 1968 (fig. 2) by Harold Clarke, a nursery machinist. The basic components were two pairs of rubber-faced rollers, which were hydraulically driven to push cuttings into the chisel trench. These rollers grasp cuttings as they are released singly into a hopper chute by an operator seated above (fig. 3). Sets of springs were incorporated to maintain a uniform tension between each pair of rollers. Such springs permitted automatic expansion and contraction of paired rollers to accept cuttings with diameters varying from 0.1 to 0.8 inch (4 to 20 mm), which is necessary for planting willow and poplar cuttings. Subsequent modifications facilitated replacement of the paired rollers when the rubber facings became worn or developed grooves after planting

Figure 2.—*Hydraulic four-roller cutting planting mechanism—1964–68.*

Figure 3.—*Feeding cuttings into planting mechanisms—1967.*

200,000 or more cuttings with variable diameters.

A four-row cutting planter was developed in 1966-67 (fig. 4), based on the performance of a two-row prototype previously reported by Cram (1).

Improved techniques for machine planting hardwood cuttings were developed by applying results of propagation research at Indian Head from 1967 to 1970. The premature sprouting of hardwood cuttings, when heeled-in outdoors over-winter, was found to reduce rooting of late machine plantings. Refrigerated storage was reported by Cram and Lindquist (3) to maintain the dormancy of hardwood cuttings and provide 75-percent rooting with machine planting. However, rooting of late machine plantings was decreased by desiccation of exposed cutting tops during the prevailing hot weather of June and July. This problem was overcome by planting 6-inch cuttings, which were pushed down to ground level. In addition, weed control with postplanting herbicides was improved when the planted row area was leveled.

From 1966 to 1971, the cutting planter's packing wheels were modified to incorporate the techniques just discussed (fig. 5). The original two rubber-tired wheels were replaced by metal wheels in 1966 to increase compaction of soil around the cuttings. However, these packing wheels left a depression into which the herbicide-treated soil moved with irrigation, and weed

Figure 4.—*Four-row hardwood cutting planter— 1966–67.*

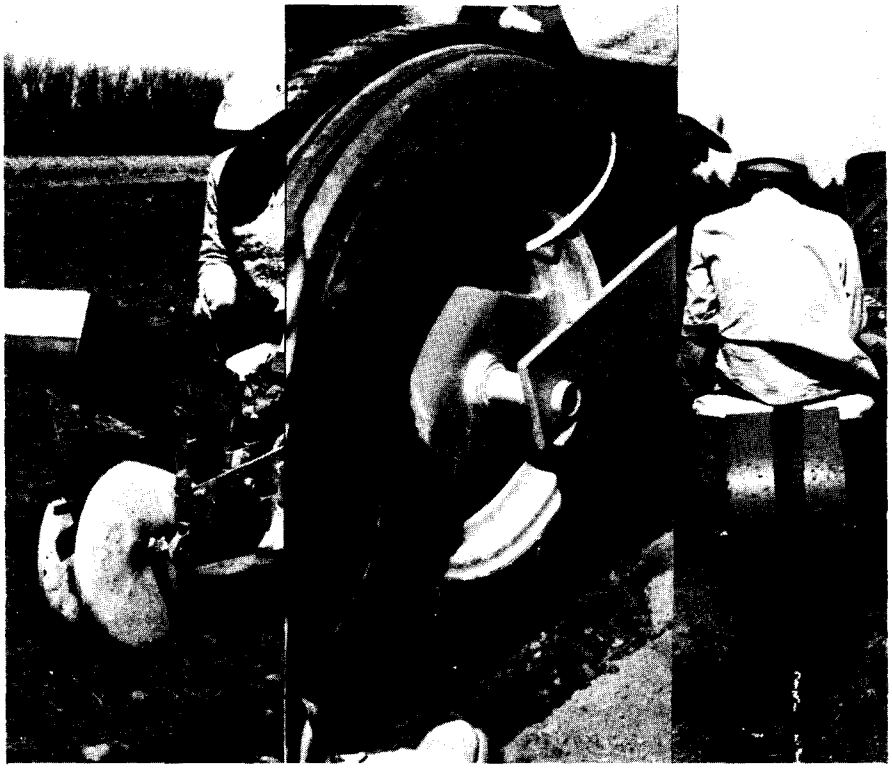

Figure 5.—*Changes in cutting planter packing wheels— 1966–71.*

control was reduced. A rubber-tired packing wheel with a slotted face was developed in 1969 to push 6-inch cuttings down to ground level, but this also made a depression. Finally, in 1971, a broad metal packing wheel with a central, slotted band of rubber was fabricated. This wheel proved capable of pushing cuttings down to soil level and into firm soil at the base of the chisel trench. In addition, the wheel left a flat planted strip, which increased the efficiency of postplanting herbicides and irrigation applications.

Two four-row planters with these modifications (fig. 6) have been used since 1972 for annual plantings of 2 million poplar and willow cuttings. When drawn and powered by hydrostatic tractors with creeper gears, the cuttings may be planted at 1-to 2-inch spacings in the row. Willow cuttings, which have a smaller diameter than poplar cuttings, are planted first to reduce wear and the need for replacement of the rubber rollers on the planter.

Plans for the fabrication of this four-row planter, which were donated by Harold Clarke, are available for loan only, on a first-come, first-served basis.

Figure 6.—*Two four-row cutting planters in operation—1972.*

Literature Cited

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