

FIELD PRODUCTION OF ROOTED POPLAR CUTTINGS FOR PRAIRIE PLANTINGS

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ABSTRACT: The Prairie Farm Rehabilitation (PFRA) Tree Nursery at Indian Head, Saskatchewan, produces 300,000 rooted poplar cuttings annually for farmstead shelterbelt plantings in the Canadian prairie provinces. Hardwood cuttings collected from stooling beds are planted during the last two weeks in May with a tractor-drawn mechanical planter capable of planting 80,000 cuttings per day. Four months after planting, rooted cuttings are mechanically harvested for shipping to prairie farmers the following spring.

INTRODUCTION

The first homesteaders to arrive in Western Canada soon appreciated the value of trees and shrubs as a means of protecting their homes and livestock from the wind. Early attempts at establishing trees imported from the United States and Eastern Canada met with little success, due to the dry climate and harsh prairie winters. As a result the Canadian government established a nursery in 1902 at Indian Head, Saskatchewan, to provide hardy tree and shrub material for prairie farmers. Orders for seedlings increased from a few thousand in 1904 to more than two million in 1910. To date over 450 million seedlings have been distributed to prairie farmers by the PFRA Tree Nursery.

Shelterbelts are as important to prairie farmers today as they were at the time of settlement. In addition to farmstead belts, shelterbelts are now used as roadside plantings to reduce road maintenance costs by preventing blockage by snow. During the past 40 years there have been periods during which there was considerable interest in the use of field shelterbelt plantings. This has been especially true in those areas where soil drifting is of concern. In the dry 1930's, over 1,000 miles (1 600 km) of field shelterbelts were established. Interest in field shelterbelts continues with over 400 miles (640 km) planted annually. More recent tree planting developments include watershed protection plantings and specialized plantings for wildlife and land reclamation sites.

Poplars have been used for shelterbelt and amenity purposes on the prairies since the turn of the century. Early settlers used the native aspens in

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Paper presented at combined meeting of the Western Forest Nursery Council and Intermountain Nurseryman's Association, Coeur d'Alene, ID, August 14-16, 1984.

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farmstead shelterbelts because the species grew readily under various soil and climatic conditions and provided reasonably quick protection from winds and drifting snow. However, the shortcomings of the native poplar species became evident and more suitable hybrid clones were developed or introduced. The major species and clones planted over the years were plains cottonwood, Russian poplar, Northwest poplar, and Walker poplar. Northwest (*P. deltoides* x *P. balsamifera*) and Walker (*P. deltoides* cv. 'Walker') poplars are the clones that are presently distributed by the tree nursery. Northwest is a hardy male clone, characterized by moderately fast growth and a spreading form, whereas Walker poplar is a very fast growing, upright, female clone that is moderately resistant to most common insects and diseases. Since poplar was first produced in 1909, 15 million unrooted cuttings and 4 million rooted cuttings have been distributed by the tree nursery to prairie farmers. Demand for poplar remains high with approximately 300,000 rooted cuttings distributed annually with the majority planted in farmstead shelterbelts where rapid growth is desired.

EQUIPMENT DEVELOPMENT

From 1909 until 1966 an average of 300,000 unrooted hardwood cuttings of poplar were produced and distributed annually for farm shelterbelt plantings. During this period, some cuttings were rooted prior to distribution, either by covering them with soil manually using shovels or by placing cuttings in ploughed furrows, then covering and packing. These labor-intensive methods restricted mass production of rooted cuttings so that it was necessary to distribute unrooted hardwood cuttings for shelterbelt plantings. However, the plantings often failed during dry years. As a result, the development of a mechanized nursery planter that would facilitate large-scale production of rooted cuttings was essential.

The first prototype mechanical planter, developed in 1963, utilized a chisel that made a 10-inch (25-cm) planting trench. Although this planter increased the speed of planting, the cuttings were often damaged. In 1964 a planting mechanism made up of two pairs of hydraulically driven-rubberfaced rollers was developed by tree nursery staff (fig. 1). The rollers grasped cuttings that were fed singly into a hopper and inserted them into the chisel trench. Further modification to this basic unit included changes to the planting mechanism that facilitated replacement of worn rollers and packing wheels that would push 6-inch (15-cm) cuttings to ground level. Two four-row planters with these modifications were capable of planting 750,000 hardwood cuttings in less than four days (fig. 2).

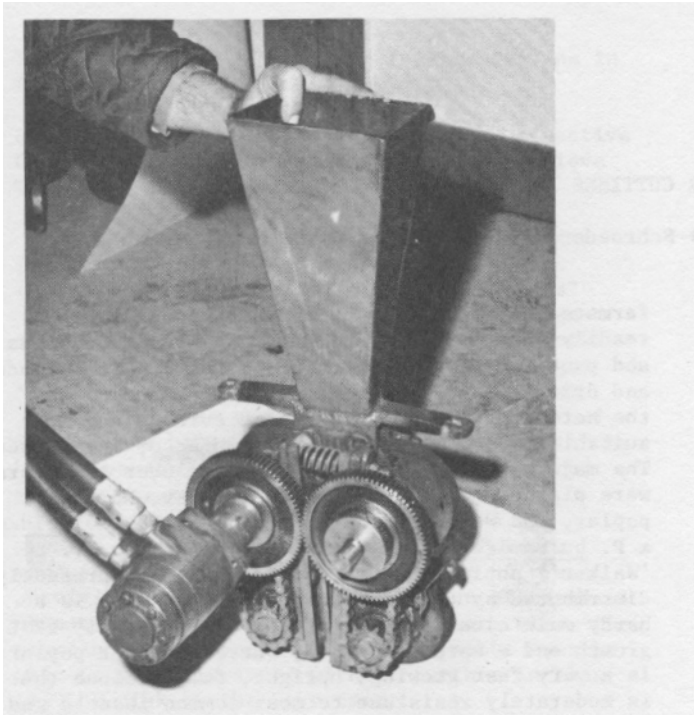


Figure 1.--Hydraulic four-roller cutting planting mechanism.



Figure 2.--Four-row cutting planter in operation.

POPLAR PRODUCTION

A major activity in poplar production is the establishment and maintenance of poplar cutting beds. Successful production of cuttings is a function of the intensity of nursery cutting bed management. As a result, cultural practices such as weed control, irrigation, and pest control are essential for maximum cutting production. Cutting beds have a productive life of approximately 9 years after which they should be removed and new beds established at regular intervals. In order to produce the number of cuttings required each

year, approximately 15 acres (6 ha) of beds are maintained. The harvesting of whips for cutting production is done in the late fall and involves tying branches in bundles and cutting the stems with a sickle mower. All side branches are pruned flush with the stem which is then cut in 6-inch (15-cm) lengths with a pneumatically driven knife and placed on a conveyor belt. As the cuttings pass along the conveyor belt, they are graded to a uniform size and then dipped in a benlate fungicide prior to overwinter storage at 28°F (-2°C) in polyethylene-lined bins.

The hardwood cuttings are generally planted during the last 2 weeks of May. The mechanization of poplar production dictates that the soil be loose and friable. Therefore the fields are rotovated to a depth of 8 inches (20 cm) prior to planting. Cuttings are inserted into the soil by feeding two sets of rubber-faced rollers driven at high speed by hydraulic motors. Operators drop cuttings individually into a small hopper as fast as possible so that plant spacing ranges from 1 to 2 inches (2 to 5 cm). The inserted cuttings are pushed to ground level with a rubber slotted metal packing wheel attached to the rear of the planter. Immediately following planting the field is leveled and packed and then sprayed with linuron at a rate of 2.21 lb/ac (2.5 kg/ha) which provides weed control during the entire growing season. Irrigation is applied immediately after spraying and throughout the growing season as required. Crops are closely monitored and immediate action is taken if insect or disease problems arise.

After 4 months, the rooted cuttings are ready for harvest (fig. 3). Prior to lifting, the young plants are topped to a uniform height of 14 inches (35.5 cm) which facilitates mechanical harvesting and handling as well as providing for a good top root ratio. After leaf drop (natural or induced with the chemical defoliant endothall) the rooted cuttings are lifted, placed in wooden pallet boxes, and transported to the packing shed for sorting. The rooted cuttings are stored overwinter in polyethylene lined bins at 28°F (-2°C) heeled-in outdoors. The following spring the young plants are bundled and shipped to farmers for planting in farmstead shelterbelts.

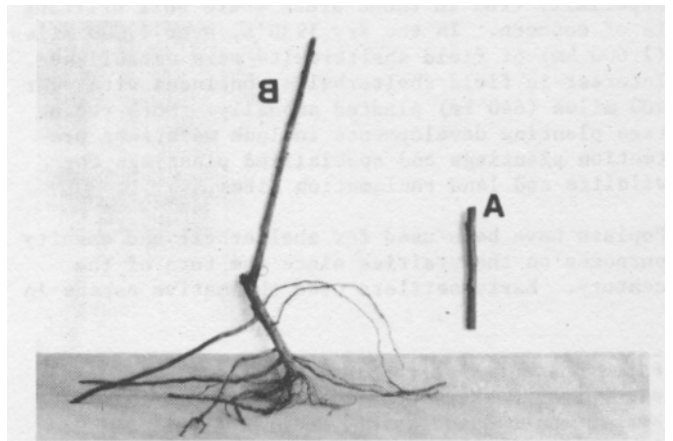


Figure 3.--An unrooted cutting (A) and a 4-month old rooted cutting (B).