DIRECT PLANTING OF POPLAR STEM CUTTINGS

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SUMMARY

Stem cuttings of balsam poplar and three poplar hybrids were directly planted onto reclamation material on the tailings dyke slope. The overall rooting success was poor. The hybrids, however, rooted significantly better than the native balsam poplar.

Cuttings require precise environmental conditions to initiate roots and grow into normal seedlings. Since favourable field conditions cannot be assured, directly planting poplar cuttings onto reclamation sites is not recommended.

DIRECT PLANTING OF POPLAR STEM CUTTINGS

INTRODUCTION

Poplars are fast-growing trees. Their rapid rate of growth and wide-spreading root systems are ideally suited for reclaiming areas requiring "instant" vegetative covers.

Stem cuttings of balsam poplar (indigenous, non-hybrid) and three poplar hybrids (non-indigenous) had been successfully propagated at the Syncrude greenhouses. When sufficient roots had developed, and the cuttings were capable of surviving without constant care, they were then transferred to the shadehouse for further root development and shoot growth in preparation for planting.

Given the proper conditions, poplar cuttings root easily and quickly. Hence, the possibility of bypassing the rooting and growing stages in the greenhouse/shadehouse by directly planting cuttings onto reclamation sites warrants some investigation. If this procedure works, premium greenhouse/shadehouse spaces may then be used for growing other tree species to increase production in order to meet the demand as more land becomes available for reclamation. Thus, a substantial reduction in seedling production costs can be attained.

OBJECTIVE

To test the feasibility of direct planting poplar cuttings onto reclamation sites.

METHOD

The experiment was located on the slope of tailings dyke cell #5 that had been capped with suitable reclamation material three years earlier. One week before planting the ground was disced to loosen up the soil and also to reduce ground cover density.

Poplar cuttings were collected from a plantation established in 1987 on dyke cell #4. Only stems from the last season's growth were taken. Cuttings were gathered in the morning on April 22, 1991. They were cut into approximately 25 cm long, bundled into groups of fifteen, tied with rubber bands and spray painted at the

top ends to minimize subsequent moisture loss. The paint was also useful for stem orientation to ensure they were planted "right side up". After painting, these cuttings were immediately placed in plastic pails with their bottom ends stuck in moist peat moss. They were kept in the pails until all the required cuttings were collected; while being transported to the research plots; and also during planting as the pails were being carried to the designated planting spots.

The cuttings were planted in the afternoon of the same day. Planting was done by four people, using hand shovels. Each person was assigned a row to plant. The cuttings were stuck approximately 15 cm into the ground. A minimum of two healthy buds were left protruding aboveground where new shoots would initiate after rooting.

The plot lay-out is shown in Figure 1. Each plot was 52 m long by 15 m wide with a 5 m buffer zone between plots. Cuttings were planted at 2 m apart in straight rows; one poplar species/hybrid per row. The rows were assigned at random and spaced at 3 m apart. Each treatment plot was replicated four times.

The following were the species/hybrids tested :

Balsam poplar	(indigenous; non-hybrid)
Northwest poplar	(non-indigenous; hybrid)
Walker poplar	(non-indigenous; hybrid)
38P38 poplar	(non-indigenous; hybrid)

Rooting assessment was done on September 25-30, 1991. Rooting was considered successful if a live shoot was present at the time of assessment.

RESULT

The result is summarized in Table 1. Rooting success was very low. The hybrids rooted significantly better than the native balsam poplar.

Table 1. Mean rooting percentage of poplar cuttings.

Poplar cuttings	Balsam	Northwest	Walker	38P38
Mean % rooting	7.7	14.4	18.3	22.1

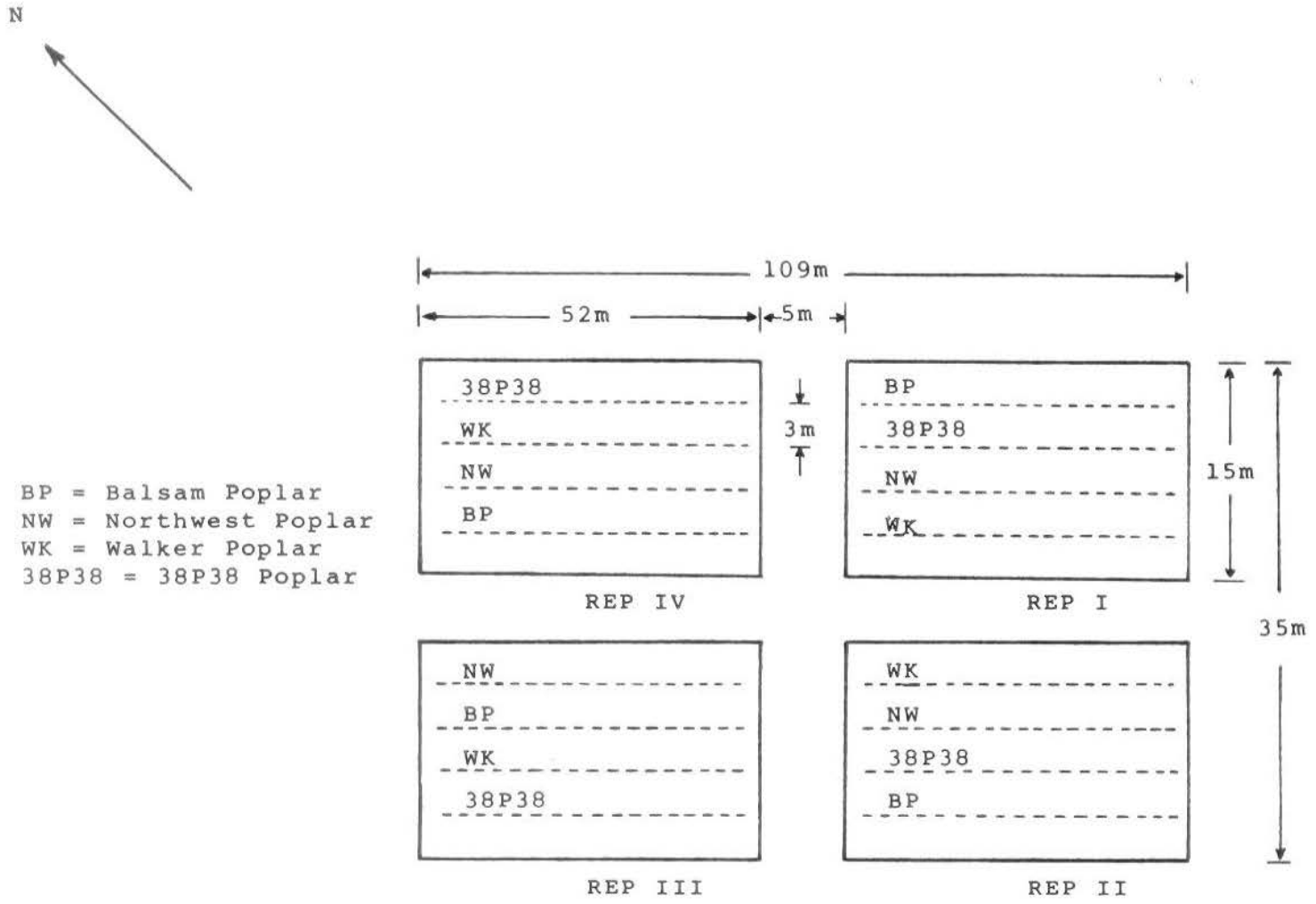

Figure 1. Hybrid Poplar Cuttings Experiment Plot Layout.

DISCUSSION

Although poplar cuttings can be easily and quickly rooted under controlled environment, rooting and subsequent growth of cuttings directly planted onto reclamation sites proved to be difficult to achieve.

Under controlled environment, cuttings are planted in moist rooting medium. High relative humidity is constantly maintained to minimize moisture loss from the stem tissues to sustain cell turgidity in order to keep the cuttings alive until sufficient roots have developed for the plants to grow independently. Maintenance durations vary depending on the species; shorter for easy to root species and longer for more difficult to root species. Throughout this period, soil moisture is precisely regulated to satisfy the requirements for root initiation and development. Severe soil moisture deficit, even for a short time, can result in failure of the cuttings to initiate roots or death of the plants because, at this stage, they have no means of alleviating such stresses.

Successful rooting and subsequent growth of cuttings planted directly in the field very much depend on the environmental conditions as well. Field conditions during the critical rooting period must correspond with those provided under controlled environment. Otherwise, rooting will simply not take place.

For this experiment, the cuttings were planted on April 22 (during spring thaw) to take advantage of the initially high soil moisture and relative humidity following snow melts. However, no further precipitation occurred until May 9. Meanwhile, the soil moisture was being rapidly depleted through evapotranspiration. Field observation in early summer showed that a substantial number of cuttings had actually rooted and begun to produce new shoots. Unfortunately, the favourable field conditions did not persist long enough for the process to proceed to the stage where the plants could continue growing. Subsequently, a significant number of plants died. Dead seedlings were generally found on areas with heavy grass and weed cover. On the other hand, seedlings that managed to root and grow normally were predominantly located where the vegetation was sparse. This further emphasised the detrimental effect of vegetative competition on tree seedlings. The effect was much more pronounced on plants with little or no roots to begin with.

CONCLUSION

Root initiation and subsequent growth of poplar stem cuttings depend very much on the continuous availability of soil moisture and high relative humidity surrounding the cuttings. Such conditions cannot always be assured in the field. Therefore, directly planting cuttings onto reclamation sites is not a recommended procedure at this time.

Conditions of Use

Fung, M.Y.P., 1992. Direct planting of poplar stem cuttings. Syncrude Canada Ltd., Environment Division, Fort McMurray, Alberta. Report 92-1. 5 pp.