

HYBRID POPLARS: THE NEW ADDITION TO SYNCRUDE'S LAND RECLAMATION SPECIES

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ABSTRACT

Field survival and growth of three hybrid poplar varieties, Walker (*Populus deltoides* x *Populus petrowskyana*), Northwest (*Populus deltoides* x *Populus balsamifera*) and 38P38 (*Populus balsamifera* x *Populus simonii*) were compared to those of the native Balsam poplar (*Populus balsamifera* L.) in a study at the Syncrude tailings dyke. Survival rates over a three-year period were 98.7 percent for Northwest and 100 percent for Walker, 38P38 and Balsam. Mean height increment of each of the hybrid varieties significantly exceeded that of the native poplar. Subsequently, hybrid poplars are now proven suitable for addition to Syncrude's list of operational land reclamation tree species.

INTRODUCTION

Syncrude Canada Ltd. is an oil sands mining company operating at the Athabasca Oil Sands deposit in northeastern Alberta. The plant, located 40 kilometres north of Fort McMurray, produces approximately 60 million barrels of synthetic crude oil per year. The oil is sent down a pipeline to Edmonton and then to refineries.

The open pit mining processes inevitably cause land disturbances. Pre-mining land clearing destroys all existing vegetation. Physical and chemical soil characteristics are altered during overburden removal. As well, new land forms are created as a result of overburden stockpiling and the construction of tailings dykes.

Syncrude complies with Alberta Government's regulations to reclaim all disturbed lands resulting from the mining operations. The current reclamation objective is to re-establish, on the disturbed sites, a variety of self-supporting ecosystems suitable for forestry, wildlife habitat and public recreation areas. Indigenous tree and shrub species are generally planted because they are well adapted to the local climate. Species such as white spruce (*Picea glauca* (Moench) Voss), jack pine (*Pinus banksiana* Lamb.) trembling aspen (*Populus tremuloides* Michx.) and red osier dogwood (*Cornus stolonifera* Michx.) have been successfully planted on various reclamation sites. Some sites, however, are very susceptible to wind and water erosion. Therefore, the type of vegetation needed to establish a cover over these areas must have the ability to survive and grow rapidly in order to stabilize the

soil and alleviate the problem. In search of such a tree species, fast-growing hybrid poplars were field tested to determine if they could fulfill the role of stabilizing these sensitive reclamation areas.

OBJECTIVE

The objective of this study was to evaluate the survival and growth rate of three hybrid poplar varieties and compare them to those of a native poplar to determine if these varieties could be used for the reclamation of sensitive areas at the Syncrude site.

METHOD

Stem cuttings of Walker, Northwest and 38P38 were obtained from PFRA, Tree Nursery Division, Agriculture Canada, Indian Head, Saskatchewan in March 1987. Simultaneously, stem cuttings of Balsam poplar were collected from within the Syncrude Operating Lease. These cuttings were rooted in "Roottrainers" and raised in the Syncrude's greenhouse for three months prior to planting.

The research plot was located on Cell 4 of the tailings sand dyke. The area had an approximately 12 percent slope angle with a south-west aspect. The tailings sand was capped with 0.5m to 0.7m of reclamation material hauled directly from the pre-mining stripping area during the winter of 1986-87. The material was graded, fertilized and disked just prior to planting. There was no attempt to artificially establish a ground cover over the study area.

The seedlings were planted in a randomized block design consisting of four replicates (blocks). Within each replicate, groups of twenty seedlings, by variety and species, were planted at 4m x 4m spacing. The location assigned to each group was determined at random.

Seedling survival was assessed bi-annually (spring and fall) to determine if mortality had occurred overwinter and oversummer. Total seedling height was measured in the fall. Annual height increment was calculated by subtracting the previous year's total height from the current year's total height.

RESULTS

Survival

All three hybrid varieties survived equally well when compared to the native Balsam poplar. The survival rates were 100 percent except for Northwest whose survival rate throughout the three-year study period was 98.7 percent.

Growth

In this study, Balsam poplar was the benchmark for evaluating the growth of the hybrid varieties. Balsam poplar itself was considered a fast growing species in the northern region. It had attained an average height increment of 63.0cm and 56.0cm in 1988 and 1989 respectively. The annual height increment of each of the three hybrid varieties significantly exceeded that of Balsam poplar. The two-year cumulative height increments of Balsam poplar and the hybrid varieties are shown in Figure 1. The best growth, averaging 1m per season was exhibited by Walker followed in descending order by 38P38, Northwest and Balsam.

Statistical analysis using General Linear Model Procedure indicated significant differences in the cumulative height increments amongst the Balsam and the hybrid varieties. Further analysis using Tukey's Studentized Range Test showed the following differences at the $p < 0.05$ confidence level.

- All the hybrid varieties grew significantly more than the Balsam poplar.
- Walker grew significantly more than either 38P38 or Northwest.
- There were not significant growth differences between 38P38 and Northwest.

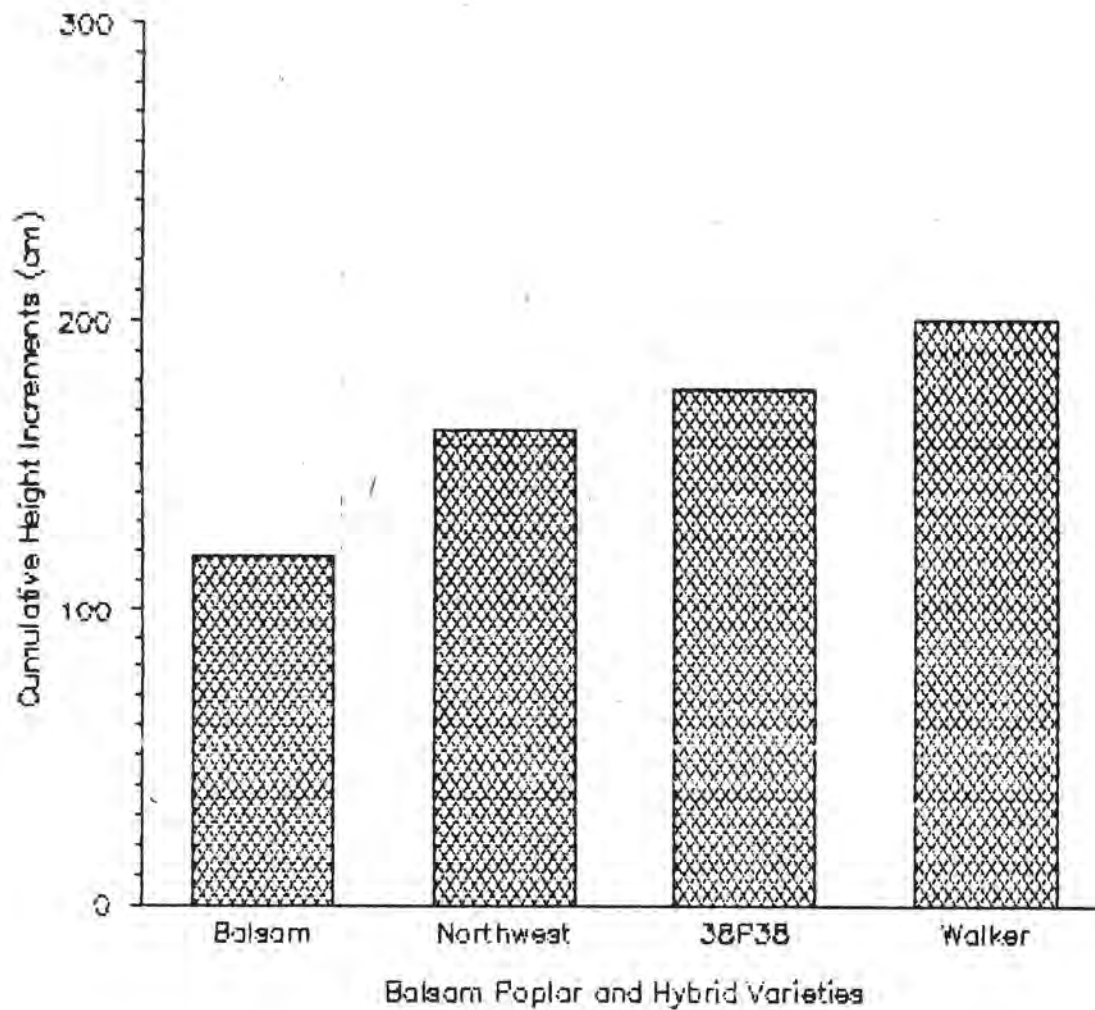
DISCUSSION AND CONCLUSION

The results clearly indicated that the three non-native hybrid poplar varieties could readily adapt to the climate around Fort McMurray. Their excellent survival rates showed that they were extremely cold-hardy and would have no difficulty establishing at the Syncrude land reclamation sites. Their rapid growth characteristics would be beneficial in expediting the revegetation process, particularly on sensitive areas, to alleviate the loss of soil materials from wind and water erosion. These poplar hybrids would undoubtedly fulfill a critical function towards the total success of Syncrude's land reclamation program. Consequently, they will be incorporated into Syncrude's choice of tree species to be grown for land restoration purposes (Fung 1990).

LITERATURE CITED

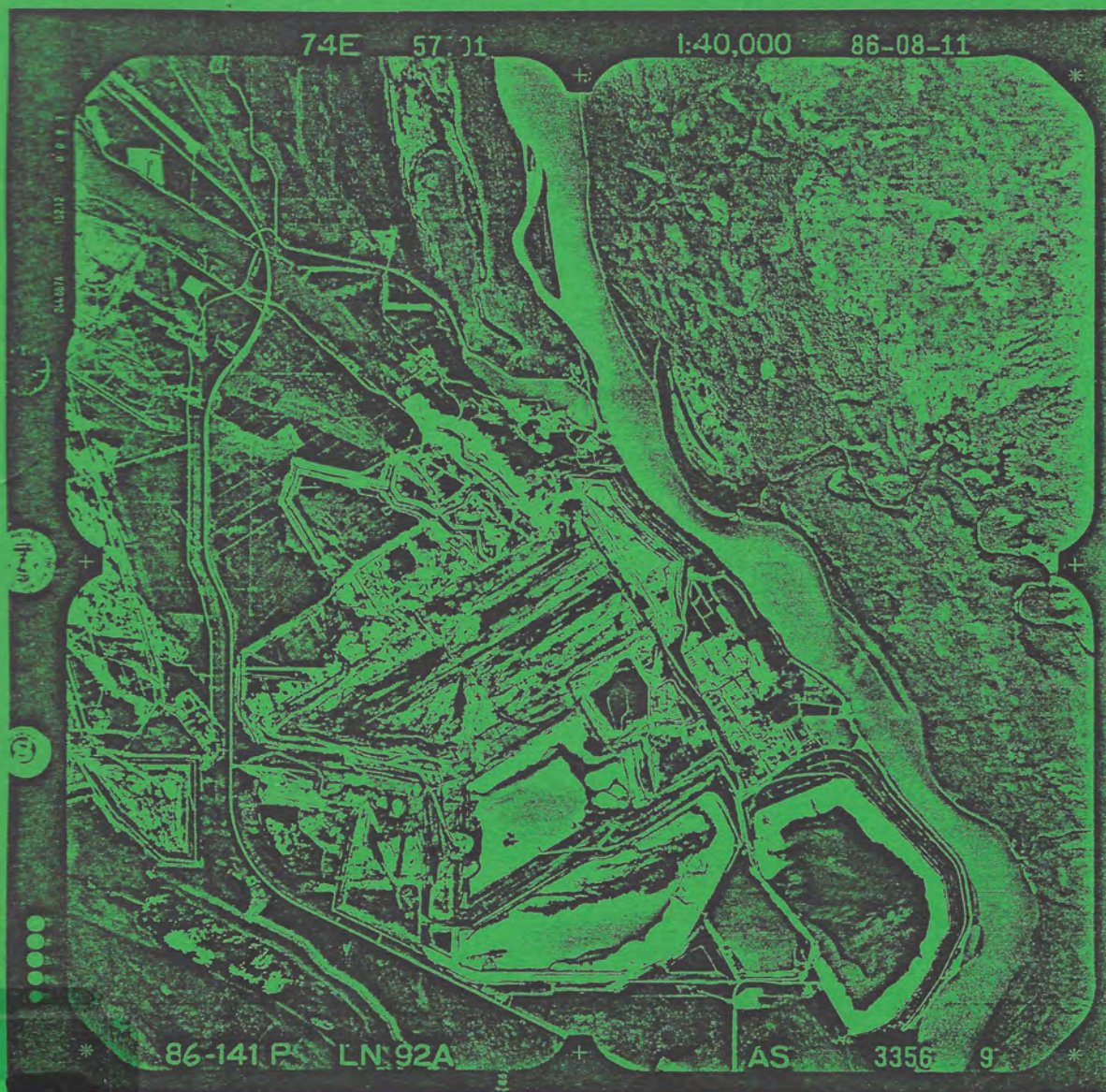
Fung, M.Y.P. 1990. Seedling Production and Land Reclamation Planting. Environment Division, Syncrude Canada Ltd., 7p.

Figure 1. Two-year Cumulative Height Increments of Balsam Poplar and the Hybrid Varieties



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Front Cover: 1986 airphoto of the Suncor facility, north of Fort McMurray, Alberta.

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DEDICATION

These proceedings are dedicated to the memory of Bruce Runge and Michael Mensforth. These two reclamationists passed away in the fall of 1990 while on the job.

Bruce Runge worked for Western Oilfield Environmental Services Ltd. as Operations Manager and was on his way to conduct a pipeline inspection in the Primrose Lake area when the helicopter he was in crashed on the outskirts of Edmonton. Bruce was 45 years old.

Michael Mensforth worked as a reclamation technologist for Alberta Environment, Land Reclamation Division and was on his way to a site in northern Alberta when he was killed in a freak vehicle accident. Micheal was 35 years old.

The loss of these two specialists is a blow to the small reclamation community of our province. It also points out to the rest of us that ours can be a dangerous profession and that safety is critical in our business.

SPONSORS

The Alberta Chapter of the Canadian Land Reclamation Association would like to thank the following sponsors for making the conference and tour a success:

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