A STUDY OF CONTAINER PLANTING IN QUEBEC (PROJECT Q-12; TUBELINGS)

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FOREST RESEARCH LABORATORY
QUEBEC REGION
INTERNAL REPORT Q-11

FORESTRY BRANCH
DEPARTMENT OF FISHERIES AND FORESTRY
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INTRODUCTION

Considerable interest is currently being expressed in the production of container-grown stock. The container-grown seedling is a comparatively new approach to regeneration silviculture and has only been under intensive study since the early 1960's. At present there are several types of containers, the one most commonly used in eastern Canada being the plastic tube, developed by the Ontario Department of Lands and Forests. This is a 3 inch-long, open-ended tube, 3/16 inches in diameter, made of high-impact styrene. In spite of the present large scale production of seedlings in these tubes, little quantitative evidence is available on the factors which are likely to affect tubeling survival and growth. A trial was established to obtain such information for black spruce (Picea mariana (Mill.) BSP.), jack pine (Pinus banksiana Lamb.) and scots pine (Pinus sylvestris Linn.) tubelings when raised and planted-out under Quebec conditions.

OBJECTIVES

To determine: a) the survival and growth rate of container-grown tree species suitable for reforestation purposes in Quebec, b) the influence of the planting date on seedling development and survival, and c) the condition of planting site most likely to produce best survival and growth rate.

PLANTING LOCATION

The area selected for the planting trial was at the Nicauba Research Forest, 310 road miles NW of Quebec. This is situated in the B.1b Forest Section. The locations of the three planting sites chosen at Nicauba are shown in Figure 1. Area 1 is a cutover, burned in 1957, which had been scarified in 1966 with ancher chains (Fig. 2). Area 2 is a cutover which had been intensively burned in 1963 (Fig. 3), and Area 3 is a recent cutover which had been logged in 1966 using wheeled skidders (Fig. 4). All three areas had formerly been black spruce - jack pine associations on a Kalmia-Vaccinium site. The shrub layers are predominantly Vaccinium and the soil is a deep, coarse, gravelly sand. Altitude is 1,800 ft. above sea level, and all sites are moderately to extremely exposed.

TUBELING PRODUCTION

The 8,000 tubelings to be used in this trial were prepared and seeded at the Laboratory on April 29 and 30, 1968. The 2:1 commercial peat moss: loam mixture used was prepared as follows. The peat was shredded and passed through a $\frac{1}{4}$ inch screen. All of the loam soil, which passed through a No. 10 screen (.0661 inch), was mixed with the peat. This mixture, which had a pH value of 4.5, was moistened prior to placing it in the soil loader[1].

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[1] For the detailed method of tube loading, seeding, sanding etc., see "Provisional Instructions for Growing and Planting Seedlings in Tubes", Revised 1967. Ont. Dept. Lands and Forests.

The 0.018 inch plate was used for sowing the seed, and the laboratory vacuum system provided the suction. Data on the seed is outlined in Table I. The sanding plates used were 1/16 inch for the spruce and 1/8 inch for the pines. The sand, which had a pH value of 8.0, was fine-textured.

Following watering and treatment with Captan 50w on April 29, all flats were placed under a plastic sheet in a dark room. Temperature was maintained at 75°-80°F. until 80 per cent of the seed had germinated. This took 7 days for the pines and 13 days for the black spruce. Following germination, the flats were transferred to the greenhouse where the temperature ranged between 60° and 78°F. The young seedlings were initially protected from direct sunlight by cotton screening, which was removed after 2 weeks. Close check was kept to detect damping-off, and to prevent this disease the flats were watered three times with Captan 50w. The jack and scots pine tubelings were transferred to the cold frames at the Valcartier F.E.S. on June 3, 6 weeks after seeding. The black spruce were similarly transferred on June 17, 8 weeks after seeding.

During the critical first 2 weeks of hardening-off in the cold frames, the seedlings were protected by slats from direct sunlight. The slats were then removed from the cold frames and replaced only if there were any signs of dessication during intense heat. The flats were watered daily during the first week, after which no artificial watering took place. All tubelings were transferred to the Nicauba Research Station on July 3. At this time, the percentage of trays containing healthy tubelings of black spruce, jack pine and scots pine

were 84, 88 and 70 per cent, respectively. In certain instances the black spruce tubes were double seeded, which accounts for the high percentage of healthy tubelings.

EXPERIMENTAL DESIGN

The planting design at each of the three locations was a randomized complete block design (Fig. 5). Each site had three blocks and each block was divided into three sub-blocks to which the species were assigned at random. Ten planting dates were used, one row consisting of 30 black spruce, 15 jack pine and 5 scots pine (Fig. 6). The spacing of the tubelings was 10 x 10 links. The total number of tubelings planted-out on Areas 1 to 3 were 2,700 black spruce, 1,350 jack pine and 450 scots pine.

It was originally intended that planting should start on June 3, but because of a delay due to the late arrival of the tube-loading equipment, planting could only begin on July 3 and took place on every consecutive week for the following 10 weeks. By July 3, some of the black spruce had barely reached the planting-out stage, most being less than 1 inch tall. Weather records were maintained at a nearby meteorological station.

FUTURE PLANS

The experiment will be repeated in 1969 (Fig. 6). As all loading and seeding equipment is now available, the tubelings will be ready for planting by June 1. This will allow full coverage of the frost-free season, which was not possible during 1968.

The tubelings planted in 1968 will be evaluated in the spring of 1969 to determine initial over-wintering effects. All tubelings will be measured in the fall of 1969 to determine growth and survival for the current year.

In order to determine any interactions between seedling survival and site, the micro site of each tubeling sampled will be recorded according to a prescribed ground condition class.

Using surplus 1968 stock, which will have over-wintered in the flats, it will be possible to determine in 1969 what effect the container has on root development. Using a randomised complete block design, these black spruce will be planted at 4 different dates using a) tubelings and b) seedlings removed from the containers. By means of this technique we hope to determine the occurrence of any root deformities and their consequent effects on seedling growth.

Table 1. Data on seed used in the 1968 tubeling program

Species	Seed Origin	Latitude	Date Collected	Germ. Capacity (per cent)
Black spruce	Nicauba, P.Q.	49°20'	1967	80
Jack Pine	Casey, P.Q.	47°50'	1967	92
Scots Pine	Shannon, P.Q.	46°10'	1965	73

Figure 1. Location of study areas 1 to 3.

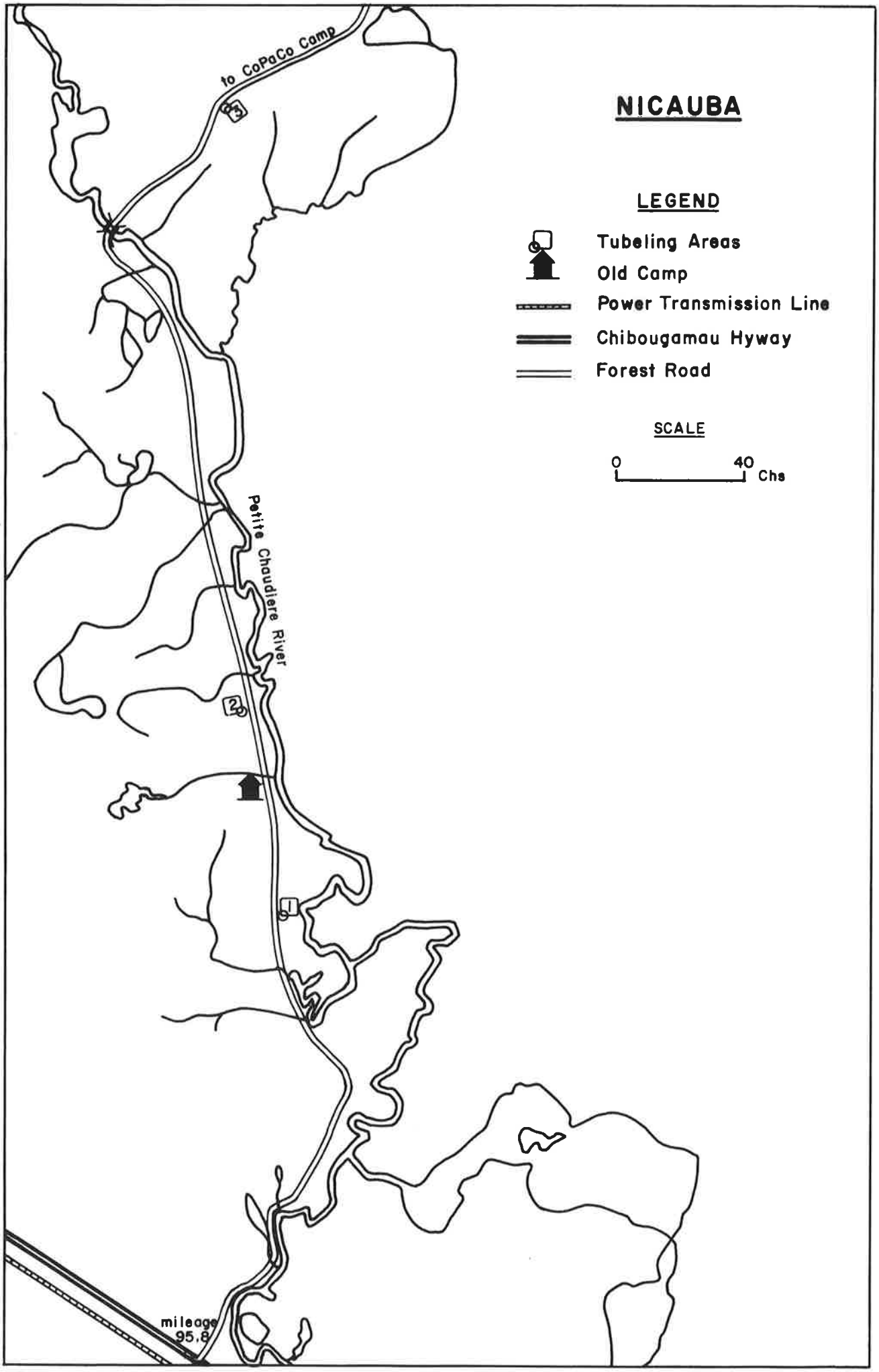

NICAUBA
LEGEND
Tubeling Areas
Old Camp
Power Transmission Line
Chibougamau Hyway
Forest Road
SCALE
0
40
Chs
to CoPaCo Camp
Petite Chaudiere River
mileage
95.8

FIGURE 2. PLANTING SITE OF AREA 1, 1968

FIGURE 3. PLANTING SITE OF AREA 2, 1968

FIGURE 4. PLANTING SITE OF AREA 3, 1968

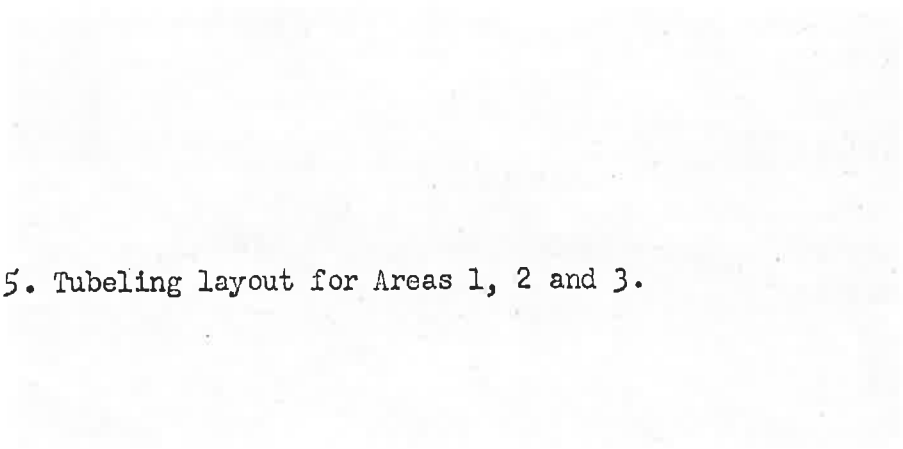
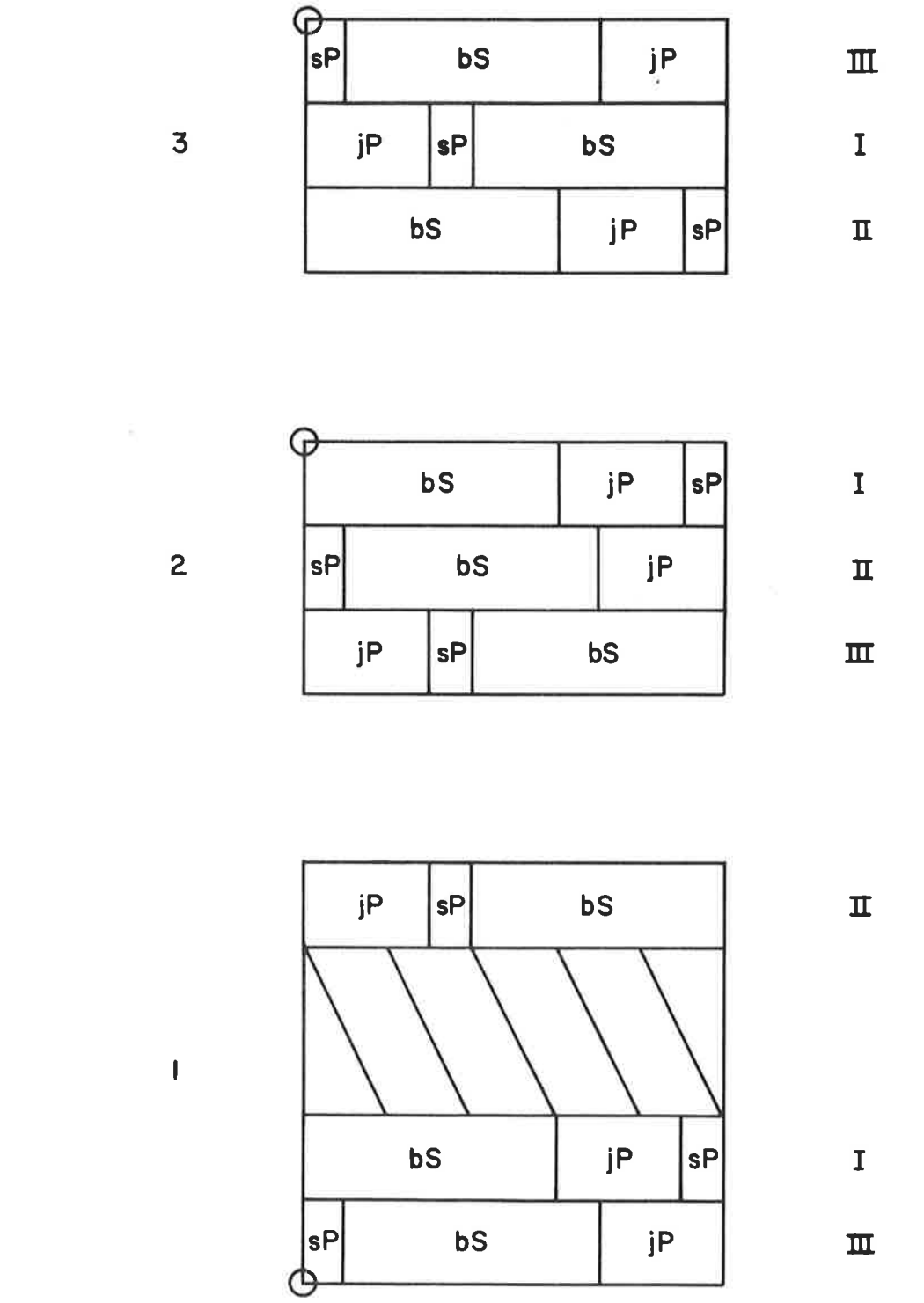


Figure 5. Tubeling layout for Areas 1, 2 and 3.

KEY MAP

Q-12 (Tubelings)

NICAUBA



SCALE

0 2 Chains

LEGEND

○ Corner Post

bS Black Spruce

sP Scots Pine

jP Jack Pine

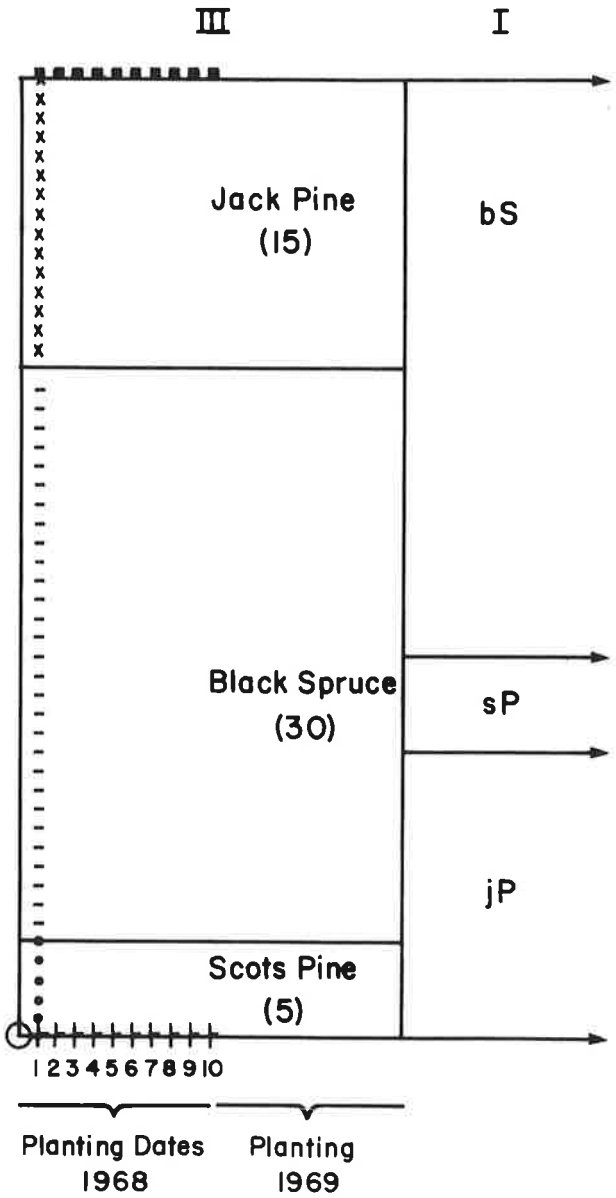
Figure 6. Detailed plan of tubeling planting by block.

TUBELING LAYOUT BY BLOCK

Q-12 (Tubelings)

NICAUBA

AREA 3



LEGEND

- ○ Corner Post
- L Aluminum Angle
- ■ Wooden Picket

SCALE

0 ——— 1 Chains