AN IMPROVED PLANTING GUN AND BULLET: A NEW TREE-PLANTING TECHNIQUE

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The variety of forms in which the planting hoe, spade, and dibble have been designed attests to a general dissatisfaction with the hand-planting tools available. The introduction of the Lowther Tree Planting Machine[1] was an important advance in forestry practice. The wide gap between the efficiency of the tree-planting machine and the dibble, hoe, and spade is tolerated for reasons usually associated with topography and logging debris. However, attempts to improve planting techniques have continued at a casual rate by individual workers and have been concerned largely with modifications to existing implements and with improvements designed to facilitate ball-planting of tree seedlings. Suggested improvements are exemplified by briquettes,[2] sandwich planting,[3] and polyethylene tubes.[4]

Preoccupation with the ball-planting method exists for good reason. A most important point in planting is to reduce the interruption of growth to a minimum, so that the plants may quickly adapt themselves to their new environment. The ball-planting method most nearly satisfies this basic requirement, but has had little application in large-scale planting programs because of prohibitive costs.

This paper describes a new tree-planting technique[5] based on an improved model of a prototype planting gun and bullet for use in field planting of small (1-0) seedlings.

The planting gun and planting bullet are complementary devices so designed as to plant tree seedlings at a rate greatly in excess of the rates permitted by contemporary techniques on areas unsuitable for tree-planting machines. To accomplish this, the planting gun and bullet use a novel method that should be superior o present practice in seedling survival, juvenile growth, and length of the planting period Specifically, the gun and bullet were designed to supersede the dibble, spade, and hoe and make use of the ball-planting technique. Both gun and bullet were designed in 1950 by the author when he was an undergraduate at the University of British Columbia. The claims on their behalf are based on field tests made from 1957 to 1962.

The planting gun (fig. 1) is a tubular device, which inserts a plastic bullet-shaped receptacle (fig. 2) containing a tree seedling, into the ground when a downward force is applied manually to the gun handle. When the downward force is discontinued, a second bullet drops to the muzzle of the gun, where it is held by spring-loaded steel balls ready for planting.

Tree seeds are sown and germinated individually in the bullets. The bullets are molded of styrene plastic, so designed to withstand sufficient force to drive the bullets into the ground and yet provide complete freedom for the growing seedling. The bullets are 2' inches in length, are seven-eighths of an inch in outside diameter, and have walls one-sixteenth of an inch in thickness. The walls are weakened by a narrow slit extending

1 Davis, J. E. The new Lowther tree planting machine. Jour. of Forestry 45(10): 746-748. 1947.

[2]Heiberg. S. O. Briquette planting. Jour, of Forestry 32: 333-336. 1934.

[3]Schubert. G. H., and Roy, D. F. Tests of sandwich planting and the mechanical planting hole digger in California. Pacific Southwest Forest and Range Expt. Sta. Res. Note 151, 10 pp. 1959.

[4]McLean, M. M. Experimental planting of tubed seedlings. 1958. Ontario Dept. of Lands and Forests Tech. Ser. Rept. 39, 13 pp. 1959.

5 Walters, J. The planting gun and bullet: A new tree-planting technique. Forestry Chronicle 37(2) 94-95, 107. Res. Note 33. Faculty of Forestry, The University of British Columbia. Vancouver 8. B.C. 1961.

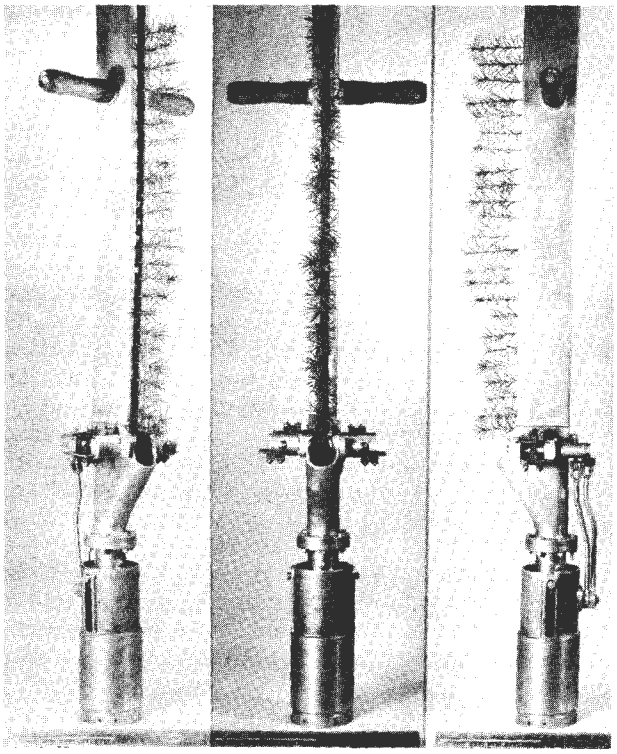

Figure 1.--The planting gun.

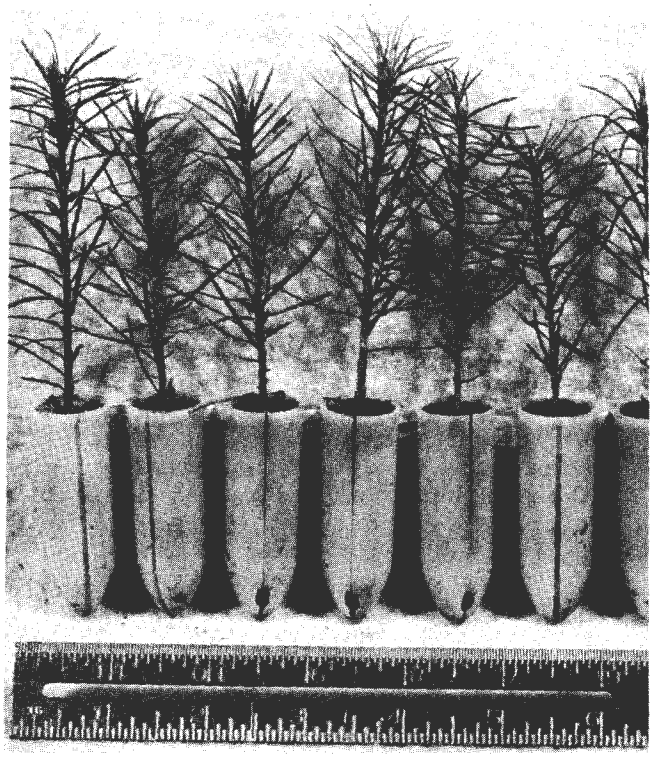

Figure 2.--Plastic bullet-shaped receptacles for use in planting gun.

longitudinally from the rim to a hole near the point of each bullet. The hole is one-half inch long and three-eighths of an inch wide, and is offset from the point to permit passage of the roots while preserving the essential profile and strength of the bullet. The bullets are molded in groups or sticks of 12 (fig. 2). Tests during 1957-60 proved that the bullets are shattered by the diametral growth of the seedlings (fig. 3). Douglas-fir and

Figure 3.--Diametral root growth shatters plastic bullet.

Scots pine seedlings shattered the bullets after three or four growing seasons without any apparent injury or confinement.

In preliminary field tests on level ground, a planting rate of 1,500 seedlings per hour was attained at a spacing of 8 feet. In addition to the rapidity of planting, other advantages expected are increased seedling survival and juvenile growth, a uniformly high standard of planting, extension of the planting season, and reduced planting costs.

The system is still in the experimental stage, and the devices illustrated and described are merely prototypes. The modified planting gun and bullet described here are believed to be extremely practical devices which can, with slight alteration, accommodate larger seedlings than those shown in figure 2. In addition to mechanical refinements, the problems that will arise in further development of the system are concerned mainly with nursery practice and the logistics of supplying the planting crew with trees at a rate that will utilize the full capacity of the planting gun. The development of a suitable nursery technique for raising seedlings in bullets in large numbers represents a complex subject. Nevertheless, the system promises many advantages, and is, perhaps, a practical solution to the problem of high speed (and low cost) planting on difficult terrain.