prevent seed and debris bouncing and rolling down the incline. An adjustable gate in the trough controls the feed rate.

Performance

Five seedlots each of white, red, blue, black and Sitka spruce (*Picea glauca* (Moench) Voss, *P. rubens* Sarg., *P. pungens* Engelm., *P. mariana* (Mill.) B.S.P., and *P. sitchensis* (Bong.) Carr.) were tested for efficiency of removing various foreign matter. The cleaner removed needles, pieces of cone scales, flat-shaped resin and twigs from these seeds effectively at angles of 28-35° and at belt speeds of 10-24 cm per second depending upon the size of seed. Each complete cleaning cycle for 10g of seed required between 3 and 5 minutes. However,

the cleaning efficiency decreased with incompleteness of de-wing-ing. Frequently a seedlot required three or four cleaning cycles to reach the clean stage. For black spruce seed the test result was poor because of the small size of the seed and the coarse texture of the canvas belt. In this case, a finer-textured canvas belt would solve the problem.

Conclusion

The belt type needle cleaner described here is effective in removing extraneous materials from small samples of tree seeds. Cleaning of any types of seeds where irregular-shaped objects must be removed from round or nearly round seeds could be carried out on this cleaner but may require a different texture for the

belt material. The open construction of the machine facilitates rapid inspection and cleaning to ensure that stray seeds from different seedlots are not mixed in successive cleaning operations. Cleaning then becomes a continuous operation and the apparatus is well suited to the preparation of laboratory samples.

Appareil à nettoyer les petits échantillons de graines d'arbre

Un appareil à nettoyer les petits échantillons de graines d'arbre est décrit. Les graines tombant sur une courroie inclinée à vitesse variable sont entraînées vers le haut alors que les débris glissent vers le bas. La marche de l'appareil est démontrée en utilisant les graines d'épinette noire.

Simulation of growth, yield and management of aspen

A semi-stochastic model was developed to simulate tree growth and stand yield information required for managing aspen (*Populus tremuloides* (Michx.)). The model is based upon new approaches for evaluating inter-tree competition effects, representing actual tree spatial arrangement, defining interactions between increments of height and dbh and competition measures, and representing random components of variation in tree growth and mortality.

In building the model, components of tree growth and mortality were identified and described mathematically or represented directly in the computer. Inter-tree competition, the most important component in the model, was extensively studied. The maximum zone of influence of a tree was derived from estimates of fully open grown crown width. A new hypothesis was advanced and mathematically expressed to describe competition effects on tree growth by exponential terms of ratios based on relative tree size.

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The model simulates height increments as if each tree was dominant or open-growing. The rate of height growth is a function of site quality. Simulated "potential" height increment is reduced, according to the tree's competitive status, to obtain height increment. Diameter at breast height increment is based on data from open grown aspen, then reduced in proportion to tree competition. Reductions from the maximum rate of growth are based on tree growth and mortality expected in normal aspen stands.

In the model, mortality is directly related to the tree's competitive status and inversely to its current increment, including random variation, in relation to a specified threshold value.

The model was calibrated with data from a normal stand growing on an above average aspen site in Saskatchewan. Input data were from a suitable permanent sample plot having fairly uniform clonal structure. After a few calibration runs and model refinements, simulated stand growth statistics

showed satisfactory correspondence with actual growth on the permanent sample plot, and with comparable yield table statistics. Simulations were made also for normal stands growing on poor sites and on the best sites in the same region. The model was generally satisfactory and could replace normal yield tables. After certain extensions, the revised model also simulated growth and development of initially open stands reasonably well.

The model also was used to simulate aspen stand growth and productivity in terms of tree component dry matter weights for normal stands on average sites with weight regressions determined in an associated study. For maximum production of wood fibre, the optimum rotation was 33 years for either volume or weight.

Although tested only for pure aspen stands, the model can be modified for use with other species. With further refinement, it may be possible also to simulate the growth of mixed stands and unevenaged stands.