British Nursery Reports Success With Finnish Transplanting Technique

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With the continuing shortage of British labor, new techniques in producing forest trees had to be found. In May 1970 I made an extensive tour of Finland to study nursery techniques. I looked first at the Japanese paper pot system, now widely used there. The main species to be produced by this method are Scots pine and birch, but it has a good future for many species; most important, I think, is Corsican pine. Transporting pots to the forest is a problem as they have to be carried in trays.

At Rovaniemi State Nursery within the Arctic Circle, I was told that several million Scots pine had been produced by the paper pot system, and that field results were very encouraging. On closer questioning, I learned that in Finland only three main tree species are used in the forest, namely Scots pine, Norway spruce, and birch. The manager at Rovaniemi told me that although Scots pine is successful in paper pots he was not able to produce a large enough Norway spruce plant in one season. He had therefore tried a Finnish technique known as the "Nisula" System. The name Nisula comes from the inventor, a scientist, Pentti Nisu la, of the Forest Research Institute of Finland. The system is simply producing seedlings in a roll of peat, fertilizer, and polyethylene. First trials were carried out in 1965.

Methods

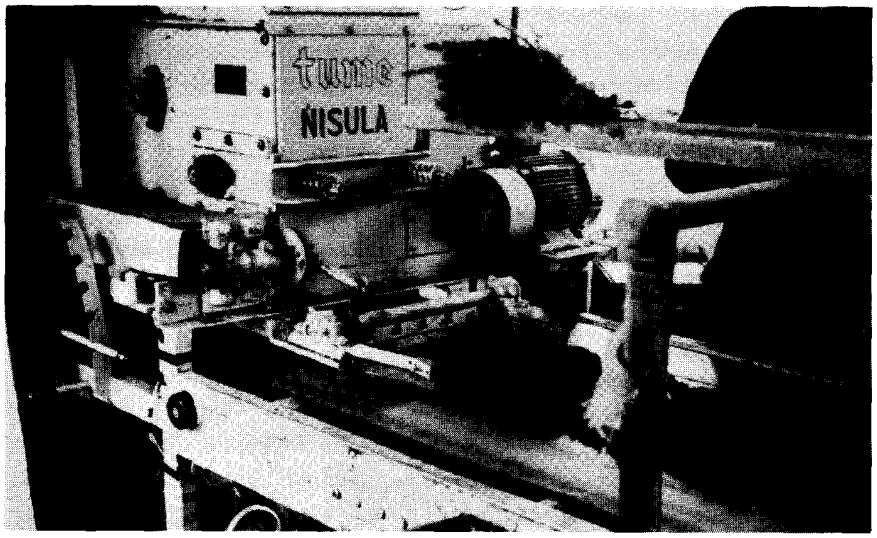
A length of polyethylene film 12" wide, 100 gauge, was laid on a bench. On this film fertilized peat was spread, seedlings were then placed on the peat each side of the film, roots to the center of the roll. The polyethylene, peat, and seedlings were then rolled up like a Swiss roll and the end of the roll secured with Bostick. The roll was then cut in half with a hand saw, making two rolls 9-inch diameter by 6-inches depth, and the rolls were then stood on a hard surface and allowed to stay in this position until taken to the forest for planting.

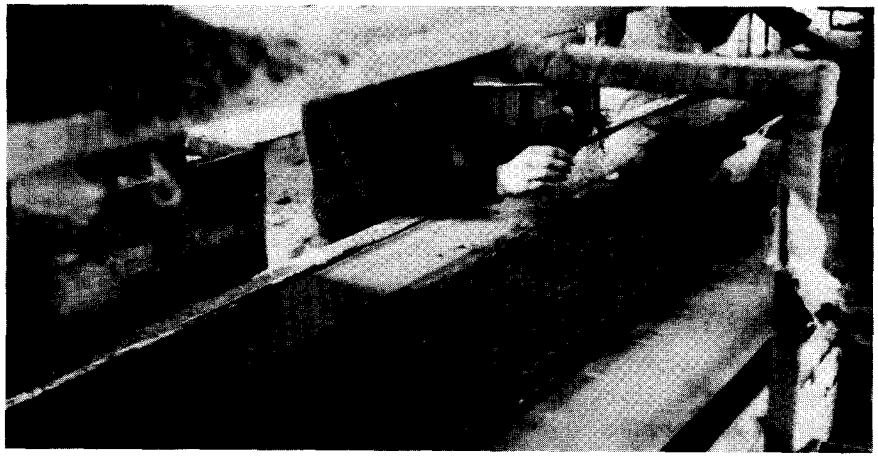
At Rovaniemi, several million spruce were growing in rolls. The seedlings were 1-1 stock and 8-12 inches in height, an ideal size for exposed plantings.

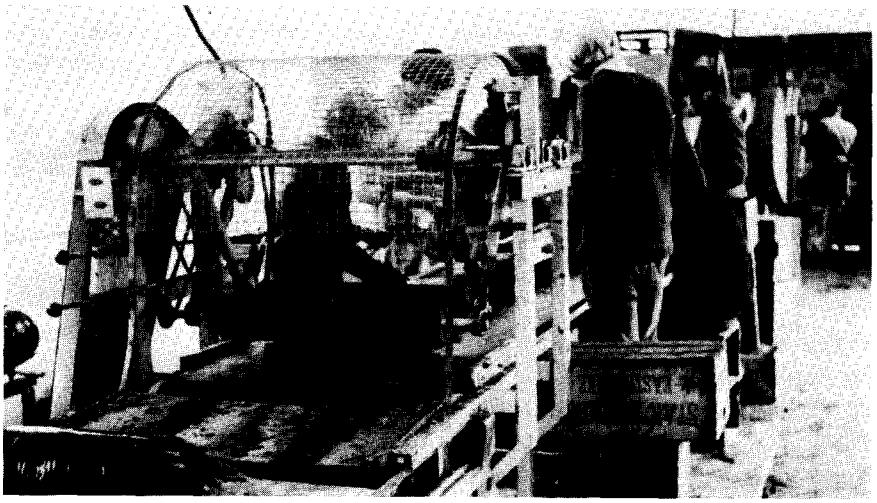
My company decided to adopt the Nisula System, mainly to produce Sitka spruce. I returned to Helsinki to discuss the purchase of the Nisula machine and had a meeting with Pentti Nisula to obtain all information regarding the operation. After discussions and films on the method, we took delivery of the Nisula Machine in March 1971. (This is the first machine to be exported from Finland, but they have inquiries concerning 200 machines from other parts of the world.)

Equipment and Operation The machine consists of a convey or belt onto which the polyethylene film is introduced at the conveyor end; fertilizer is then fed onto the film (by a lawn fertilizer spreader), followed by peat; a reciprocating blade then spaces the peat into small heaps 9 inches apart; seedlings are fed onto these heaps by four men or women from each side of the belt. To start the roll, the polyethylene is given about three turns by hand; the roll then proceeds toward the other end of the conveyor. At this end are two rotating dimpled rubber rollers. The started roll is held between these rotating rollers and rolled under pressure to correct size. The last man on the belt places a smear of Bostick across the film which joins the roll. The man operating the rollers releases the roll, which is taken off the conveyor and placed on a cutting machine produced in our own workshops. The cutter consists of a power saw electrically operated and a spring-loaded cradle into which the roll is placed. The weight of the roll takes it through the saw, and the cut roll is then taken by conveyor to be placed on a specially designed

Figures 1-3. The Nisula transplanting machine and its operation.







trailer we produced. It consists of moving floor pivoted at the point of balance onto a trailer chassis. When loaded, the moving floor is locked in position and is controlled by a handle; rolls are placed on the end of the trailer and progressively wound forward until the trailer is loaded. The trailer is then taken to the nursery by tractor; the moving floor is tipped, and as one man winds the handle, the tractor moves forward and the rolls are pushed off the trailer, meaning only one handling operation.

The peat is fed onto the Nisula machine by a converted meal mixing machine which not only breaks up the peat but also enables lime to be added. Water is sprayed onto the peat and the whole combination is mixed and then transferred to a conveyor and then on to the Nisula machine.

Discussion

The advantages of the Nisula method are:

1. Approximately 3,000,000 seedlings can be produced on one acre against 4-500,000 by conventional methods.
2. There is no need to lift, grade, tie or heel in plants.
3. Transplanting can be put on a factory basis, which means that it can go on no matter what the weather conditions. Seedlings to maintain the operations can be held in cold storage.
4. Substantial reductions in costs are possible as large quantities of fertilizer, spent hops, and cultivations are not required, and less land area is needed.
5. A production of up to 120,000

seedlings per day for 12 operators is possible, according to the Finns. (We have only managed to obtain 60-70,000 to date. We hope to improve on this in the coming year.)

6. In the forest it is no longer necessary to heel in plants.
7. Planting can be carried on over a longer period.
8. A higher survival rate can be achieved in the forest as the tree has its own plate of peat on the roots, which gives an almost root-balled plant.

The machine and the method are patented in 18 countries including Great Britain, and royalties must be paid to Finland for plants produced by this method.

We produced 200,000 plants by the Nisula method this season using a variety of species : Scots pine, lodgepole pine, thuya, *Abies Nobilis, Abies Grandis,* Sitka spruce and Coriscan pine. We are convinced that the method can be used to produce other species including ornamentals, cuttings of heathers, azaleas, and others.

Transporting rolls to the forest is a problem because of their bulk. Number of plants per roll at the moment is 35, but we hope to reduce the amount of peat and increase the number of plants to 50. We still have a lot to learn about adapting the method to our climatic conditions and growing season, which are so different. from Finland's, but I believe in the future all plants will be produced in a container of some kind whether it be Nisula, paper pot or peat pot.

Introduction of this machine and method is another first for Tilhill. In 1965, Tilhill built the first Danish-designed jacketed cold store for the storage of forest trees, and is the only privately owned forest nursery company to offer an approved and fully comprehensive training scheme to teach youngsters forest nursery practice.