

New Swedish Seed Orchard Program

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Swedish forestry is now gradually switching their seed source of Scots pine (*Pinus sylvestris* L.) and Norway spruce (*Picea abies* L Karst.) from the first to the second round of seed orchards, and at the same time in cooperation establishes a third set of orchards. Tree breeding enhances genetic gain in wood production by about 10% every 20 years, which fits well with the planting of new seed orchards at the same intervals. Swedish orchards reach full seed production after 15 years and have a life span of approximately 40 years.

Generally, at present, 25% increase in long-term wood production per unit area can be reached with new seed orchards. By 2010–2020 a gain of 35% can be achieved. Norway spruce will proceed more rapidly than Scots pine since clonal testing is applied in the spruce breeding program. About 40% pollen contamination in production seed orchards and up to 20% natural regeneration in planted stands causes realized gain to vary between 16 and 28%.

There are 14 seed zones for each of Scots pine and Norway spruce. An ordinary seed orchard is made up from 25 clones, which are deployed in higher frequency the greater the breeding value. The genetic diversity corresponding to at least status number = 15. Scots pine orchards are planted at 3 m spacing within rows at a distance of 7 meters. The tree rows are regularly pruned into hedges where the first cut is carried out when they have reached 3 m height. Spruce orchards are preferably planted at 2.5 by 7 m spacing in order to enhance early seed crops. They are later thinned to 5 m within-row spacing. The tree tops are cut off after mast years, whereupon new leading shoots will regenerate.

The third round of orchards is estimated to cost \$12.5 millions including establishment and management until the first seed crop. This corresponds to \$0.0025–0.005 per seedling or \$0.08 per additional cubic meter of wood produced. The internal rate of return is estimated to 7%.

There is a tradition in Sweden to run seed orchards in cooperation. In the 3:d round of orchards the forest owners' associations in Sweden are new partners among the large forest companies, the national forest enterprise, and independent forest nurseries. Each collaborator owns his share of an orchard, which is managed by an entrepreneur, generally a forest nursery. To facilitate efficient administration cooperation is carried out in three regional groups. Skogforsk initiated the national program, produced the basis for decision making, and is coordinating the program under supervision of a board of representatives from the three cooperative groups.