

## Seed orchards and supporting breeding

Seed orchards are the main outlet and work horse for forest tree breeding. Seed orchard programs should be supported by long term breeding, this lecture assumes this has been going on for some decades.

Seed orchards often use grafted genotypes with high estimated breeding values. With Norway spruce, where vegetative propagation of juvenile material is easy, current seed orchard deployment is based on clonal tests. For Scots pine progeny tested genotypes have been common, but progeny testing is a painfully slow for advanced generation breeding. Recent orchards are sometimes a mixture of tested clones and untested offspring from good parents. It seems inefficient to avoid a low percentage of related clones in advanced generation seed orchards.

Very small sublines for complete elimination of relatedness does not seem optimal, but options to select unrelated should decline rather slow over generations and to some degree remain forever.

The “optimal” number of unrelated clones is often in magnitude twenty. Higher number of clones may be more common when clones are related.

It is efficient to deploy clones in optimal proportions, it is not recommended to strive for exactly equal proportions.

Long term tree breeding benefits from “breeding populations” large enough to allow among parent (among family) selection.

Synchronisation of breeding stock management and seed orchard establishment is desirable.

There are often advantages in deploying new cohorts of recently selected clones. Seed orchards become often too old considering the advancement in breeding stock.

Genetic thinning is seldom worth the trouble, but selective harvest seems an attractive option.

Pollen contamination reduces gain, a general remedy has not been found. Crops from young “contaminated” seed orchards may be competitive to mature genetically outdated seed sources.

Seed harvest cost is a major management concern.