

This was posted by Dag Lindgren 080901

Suggestion for vegetative propagation of Norway spruce in southern Sweden. Is it a good one? Has anyone something to add to make it better?

If land owners are willing to pay an additional 15c for a plant, with 10 percent increase in production, or up to 20% when no suitable seed orchard seeds are available, it seems to me that the way to do it is to make artificial crosses with the genotypes with high breeding values, and multiply the cross (full sib family) vegetatively by rooted cuttings. At least if we are talking about the situation for Norway spruce in southern Sweden, where the breeding value of many genotypes are known and operationally possible to cross, the situation may be different elsewhere. (For cases where landowners are unwilling to accept extra costs much above a cent per plant to achieve gain or other obstacles exists, instead improved seed orchards could be considered <http://pub-epsilon.slu.se/151/01/ZProcFinalFeb08.pdf>)

Massmultiplication of tested superior genotypes by vegetative propagation for deployment in forestry has been THE dream since half a century. The status some years ago in the Nordic countries was summarized by Steve Lee [http://www.forestry.gov.uk/pdf/w_s-lee.pdf/\\$FILE/w_s-lee.pdf](http://www.forestry.gov.uk/pdf/w_s-lee.pdf/$FILE/w_s-lee.pdf). Probably a more recent update exists among TREEBREEX's hidden treasures.

Jochen Kleinschmidt carried out a rooted cutting program in Germany many decades ago. Programs with Norway spruce and other spruces were taken up in many other countries at limited scale and rather low success rate. The Swedish breeding company Hilleshög tried 1980-1995 to produce and market rooted cuttings in southern Sweden. The latest effort was done by a consortium in Central Sweden 1989-2004. A general focus on these programs was that they headed for tested clones, but clones could not be preserved in a juvenile phase while testing. Only small remains of most of these programs and intentions still exists. But the situation may be better now in southern Sweden, there are many more tested clones available for crossing and even cross-seeds in archive and SE genotypes in cryostorage. The willingness from forestry to pay for increased production may be higher now; production has become politically correct; the annual harvest has passed the annual growth for the first time in three decades; energy crisis and global environment changes are evident and urgent and requires actions.

It is now an established technology to bulk propagate selected controlled crosses with rooted cuttings of Sitka spruce in the UK and Ireland. A description of the current Irish program is on http://daglindgren.upsc.se/Meetings/Finland08/Sitka_spruce_families_on_Ireland.htm. If needed, clones can be kept sufficiently juvenile, the multiplication factor from a limited seed number expanded and multiplication speeded up by in vitro multiplication (SE) in the initial multiplication phase (making stock or mother plants). Thus I think the SE technique can have an important role even in the case of rooted cuttings. What I have in mind is very similar to and inspired from the Irish program.

Probably the best tested clones from the best full-sibs offer 5 per cent more gain than bulkpropagation of controlled crosses from the best available parents, if comparison is made in a fair way (comparisons seldom seems fair and scientists frequently give figures letting the listener conclude that the gain is higher, but I believe many of this associations are misleading). I suggest that it is sufficient for practical forestry to use vegetative propagation of seeds from controlled crosses of superior parents. (like Steve Lee in his recent presentation "family forestry - who could ask for anything more?"). Clone testing is time consuming, clone maintenance during testing is yet a major problem, many genotypes are not suitable for large-scaled propagation or long term storage, monoclonal forestry adds many problems connected to production, markets,

legalities, certification and acceptance. The test and storage during testing may be more expensive if tested clones for planting is the target, than if the target is parents for crosses. When the tested clones are available, their genes can also be used for forestry via vegetative bulk propagation of their offspring, which may appear beneficial when it comes to actual decisions after the testing. The advantage of using tested clones in forestry does not seem THAT big, and they are not required to motivate initiation of a program with vegetative propagation. However, for advocates of "true clonal forestry" if bulk propagation of controlled crosses is successfully implemented, the step to tested clones may seem short and easy to implement. Thus, clonal forestry with tested clones will be greatly facilitated if the step with bulked crosses is taken first. You must learn to creep before you can walk!

Should I encourage Sweden to mainly follow the Ireland/UK example for Norway spruce in southern Sweden? In spite of some short-comings in the past?

I initiated a seed orchard discussion and got several replies, which I reacted to, thus this discussion worked. Now I try vegetative propagation to see if that is more exciting. It may raise comments and also be an appetizer for the GENE CAR supported meeting on Vegetative propagation in Finland in September 2008 <http://www.metla.fi/tapahtumat/2008/conifers/> and TREEBREED EX in UK April 2009 .

Dag Lindgren

One reply was posted:

“Use of controlled crosses which are multiplied by cuttings and use of the cutting for forest plantations is good idea to test for spruces. May to think on some simulation where we can weight cost and time and genetic gain and compare it with other strategies or may be to optimise it?”

Dag response: Yes, I think that is a very good suggestion!