GROWTH AND SILVICULTURE OF LARCH HYBRIDS

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Larch hybrids, as the term is commonly understood in the Northeast, are crosses between the Japanese (*Le rix leptolepis*) and European larch (*L. decidua*); not only the first generation Dunkeld hybrid (*L. eurolepis*) but all the subsequent hybrid generations and possible back-crosses. With us, these two species and their hybrid progeny interbreed very readily; in fact, it seems that the Japanese are often more receptive of European pollen than of their own. All these crosses, at least to F_4, exhibit hybrid vigor. So what we are talking about is the growth and silviculture of exceptionally vigorous and varied hybrid swarms.

To those accustomed to working with out white and red pines or the slow-starting spruces, the growing capacity of hybrid larch can be startling. Good stock, well planted on a suitable site, begins its rapid height growth immediately; three years to breast high and from there, for another ten years, annual increments of 3 to 4 feet or even more. After that, height growth slows down--relatively--but trees in the 30-year, 60-feet class may still be growing 2 feet a year. In diameter, growth will be equally spectacular. In understocked stands or when the larch is mixed with less vigorous associates, growth may approximate 3/4 inch a year, but the taper on such trees is excessive. At Cooxrox Forest, we have finely-formed stems of hybrid larch growing in fully-stocked stands--such as the GIANT in No. 7--that have exceeded 1/2 inch in diameter per year over 30 years, which is good increment on any tree.

Because the Cooxrox Forest plantations are mostly small and still relatively young, we do not have any sound figures on volume production. Some scattered data indicate an annual increment of 1 1/4 to 1 3/4 cords per acre per year. The best statement on volume growth is Earl L. Stone's British Yield Tables for European and Japanese Larches in New York.[2] On the basis of the measurements of some individual trees, it appears that Cooxrox Forest is Site I.

The silviculture of hybrid larch is no different than that of the parent species except, perhaps, for the more than usual variation among individual trees. The prescription that I present here is applicable to Cooxrox Forest-- latitude 42° 35' north, 1,125-1,409 feet elevation, continental climate, 41 inches of rainfall plus frequent heavy dew, 140 days growing season, well-drained and well-watered soil, vigorous competition from ferns and weed hardwoods. It will need modification to fit other situations, especially for sites with less moisture or a different length of summer day, a factor to which the larches are delicately adjusted. And we are thinking in terms of fully-stocked stands and a sawtimber rotation of sixty years, by which time well-grown larch will have 24-inch butt logs of top quality.

Real hybrid larch seed is a collector's item and is not normally available thru commercial channels. The British have sources, mostly in Scotland, that yield sizeable quantities but they tend to keep such seed at home. Here in New York, we have had two experimental seedlots (E-207 and Montgomery 1-F-1) and two production lots (89 and 122), all from Scotland. Subsequently, collections have been made from plantations of these seedlots, amounting to more than 200 pounds. Besides this,

[1] Cooxrox Forest, Albany, New York.
[2] Agronomy Paper 397, 1957, College of Agriculture, Ithaca, New York.

collections from some of our Japanese plantations have yielded significant amounts of what must be F_1 hybrids By any measure true hybrid larch seed is hard to come by.

So far as I know, there is no infallible way of distinguishing hybrid larch seed and only the most credulous put much faith in a commercial label, Nor can first-year seedlings be positively identified. But in late winter (February with us) 2-0 hybrids can be separated on the basis of twig color. The second-year twigs of Japanese larch are a shiny copper red, those of European are saffron yellow. F_1 hybrids are brick pink subsequent generations will be variable but still readily distinguishable from either parent species And those terminal twig colors persist at least until out of ready visual range. By the time trees begin to flower, at 8 to 10 years from planting, great variability in the color of female strobili and shape of cones will be conspicuous, most of the hybrid cones tending toward the large size and straight, truncated scales of European although some of our F_3s have recurved scale margins on big cones

Optimum planting stock will be 2-0 seedlings. 12 to 16 inches tall with fibrous root systems. To produce these requires a nice adjustment of seedbed density --to about 30 per square foot--and of water and fertilizer, both of which must be kept down. Overstocking produces spindly seedlings with few branches, while understocking yields over-sized trees with sprawling roots. Currently, by planting on better ground and by applying fertilizer and water during the growing season we are trying to grow plantable 1-0 seedlings

Larch seedlings tend to burst their buds with the first warm days of spring, often before the nursery beds are entirely thawed: To assure dormant stock, it is standard practice to dig larch just as soon as a lifter can be run under the beds and to hold the seedlings in cold storage until shipped. Stock on which the buds have burst is physiologically active enough to heat quickly in storage; is vulnerable to mechanical damage and to late frost and so may give very poor survival. The best procedure is to "dig today and plant tomorrow" or s near that as may be By keeping stock cool, dark and dormant until planted we would reasonably expect to get 90 percent survival in any normal year.

In the autumn, larch stock should not be dug until the wood is thoroughly mature and until the foliage has yellowed and fallen, which takes at least a couple of sharp frosts With masses of newly-dead needles lodged at the base, it takes only a little warmth to grow mold packaged stock often heats in transit and many of the trees are dead on arrival. This is a real hazard. Further, stock may not be ready for shipping from the nursery until the planting site is about to freeze up, which wakes for a short season. Fall planting can be done provided the stock can be dug and reset promptly, and that the site will have a continuous snow cover This requires considerable luck as well as adequate planning and careful site selection.

Hybrid larch will grow on a wide variety of sites, provided that the basic requirements of adequate moisture, good air and water drainage and freedom from late frosts are met. While growth is most spectacular on deep (at least 16 inches to a restricting layer other than bedrock), fertile well-watered soils with abundant rainfall, larch will do better than many other species on poorer, drier sites. But these hybrid larches are quite unlike our native tamarack (Larix laricina) and will not grow in very poorly drained soils or in swamps.

The question of species mixtures is an ever-recurring one. Our experience has been that in plantations where the smallest merchantable stem must be of pulpwood size (41 inches dbh) and where the site is even reasonably suitable for larch, no mixture will succeed. In the first twenty years, hybrid larch can be expected to outgrow red pine by 3 to 2, other species by 2 to 1. If the plantation be made with ten percent or more of larch, mixed stem-wise or in alternate rows, it will end up being a nearly pure stand of larch.

Because of rapid juvenile growth, larch is sometimes recommended as a filler for understocked plantations but, unless the timing is exactly right, this can be hazardous. Either the larch will promptly overtake the original planting--and a five-year handicap is readily overcome--or the larch itself will be suppressed and the second planting effort wasted. It is commonly believed that the intense, shallow root-mat of spruce plantations tends to intercept growing-season rainfall and in times of summer drought to seriously reduce the growth of inter-planted larch. This also has been our experience.

The juvenile growth of hybrid larch is so rapid--especially on good sites--and planting stock is so scarce that it should be used thriftily. At Cooxrox Forest we plant by mattock slit, somewhat modified by the requirements of stony, cut-over terrain, with trees carried in a bucket with water. Since 1947, our standard spacing has been 6 x 10 feet, or 726 trees per acre. To assure the high survival essential with this wide spacing, we cut down all competing vegetation within 1½-2 feet of each newly-set seedling sometime in late June following planting. This insures relatively unhampered development for the rest of that growing season which, for larch, will extend to early September. As the stand develops, we knock down any interfering hardwood to minimize competition. All this requires considerably more attention and cultural effort than plantations usually get, but it is the price of rapid and uniform development. Even at this wide spacing, hybrid larch should be in complete dominance ten or twelve years after planting.

To keep the dominant trees growing rapidly and to insure good form, both thinning and pruning must start early. We begin pruning when most of the better trees have reached 4 inches dbh and are at least 15 feet high, doing the work in three stages (0 to 7, 7 to 12 and 12 to 17 feet) taking both live and dead limbs but aiming to retain 50 percent live crown. And we prune every tree that has a reasonable prospect of going to market, for access and because we feel that it costs no more to prune a larch standing than it does to take the limbs off after it has been felled. About the time of the second-stage pruning, a first, wasting thinning will liquidate overtopped and malformed stems. By age 20-25 years, regular thinnings for commercial products can begin--for posts, pulpwood, small logs, bigger logs, maybe poles and piling.

There is much loose talk to the effect that larch plantations will be succeeded by the semi-tolerant hardwoods that develop as an understory. But no responsible forest manager would permit the replacement of good larch by <u>anything</u> else. For myself, I would harvest a mature stand of hybrid larch by killing off the hardwood understory with 245T, either by foliar spray or by trickling, clear-cut the timber and start over again with a new, planted stand of even better hybrid larch.

The way to grow hybrid larch in the Northeast is to use stock that is genetically well adjusted to the site, plant wide, plant pure, tend carefully, thin early and often, and reap a rich harvest of valuable wood grown on finely-formed, easily-logged stems.