LARCH SYMPOSIUM IN SIBERIA

IUFRO Interdivisional Symposium "*Larix*-98: World resources for breeding, resistance and utilization" held in Russia, Krasnoyarsk, September 1–5, 1998.

The genus *Larix* Mill. covers a great part of the boreal and alpine forests. Larch species are the most common conifers in northern Asia and they play an important role in European and North American forest economies. The significance of larch species is expected to be increased in the near future due to high wood quality and rather high growth speed, resistance to natural and anthropogenic stress factors, yield potential and increasing access to larch resources in the forests of Northern Asia. Success of the first international symposium "Ecology and Management of *Larix* Forests: A Look Ahead" (Whitefish, Montana, USA, 1992) showed necessity of regular meetings. Russia where the larch forests occupy about 40% of forest land was chosen for organization of this symposium. Symposium in Krasnoyarsk was focused on larch forests resistance, improvement and utilization to tackle this issues internationally as well as domestically.

Symposium was organized by the IUFRO, V. N. Sukachev Institute of Forest SB RAS, Siberian International Centre for Ecological Research of Boreal Forests, Siberian State Technological University, Krasnoyarsk Committee for Forestry, and initiated by Siberian Branch of Russian Academy of Sciences and Scientific Council on Forest Problems of RAS. Symposium was partly sponsored by Krasnoyarsk Regional Science Foundation.

More than 100 scientists from 7 countries (Sweden, Norway, the USA, Canada, Japan, Iceland and Russia) took part in Symposium; they presented about 60 oral reports and about 40 posters. The participants of Symposium represented three Divisions of IUFRO: Division 2 – Physiology and Genetics, Division 5 – Forest Products, Division 7 – Forest Health.

The Symposium was aimed at:

1. Larch genetics, breeding and silviculture.
2. Ecological and physiological mechanisms of larch resistance to stress (nutrition, freezing, flooding, fire, pests and diseases, pollution etc.).
3. Utilization of larch-tree biomass (physical and chemical properties and utilization of larch wood, bark and foliage).

Many oral presentations and posters of Symposium were focused on results of genetic and breeding researches. Some debatable problems of systematics and variability of Russian larch species were discussed in L. I. Milyutin's plenary lecture "Larches of Russia (taxonomy, intraspecific differentiation, variability)". It should be noted that systematics of Russian *Larix* species especially for Far East of Russia is not elaborated until now. Therefore many papers of Russian participants were devoted to discussion of this problem and larch systematics on the whole: V. P. Putenikhin "Phenotypic analysis and taxonomy of larches", V. L. Semerikov "Phylogenetic relationships of some of Eurasian and American larch species inferred from allozyme data"; E. N. Muratova "Taxonomical relationships of larch species based on karyotype analysis". Presentation of Japanese investigators H. Kisanuki with co-authors "Phylogenetic study on the genus *Larix* using randomly amplified polymorphic DNA" contains interesting data touching these problems, too.

A. I. Iroshnikov (Russia) presented the lecture "Larches of Russia: breeding program". In A. I. Iroshnikov's opinion the problems of *Larix* systematics and evolution can be solved only on the basis of breeding programs of these species. A. I. Iroshnikov presented three more papers: "Test of larch provenances in Middle Siberia", "Spontaneous hybrids in larch stands", "Selection of Siberian larch trees tolerant to *Dasyneura laricis* F. Lw. ".

Several presentations and posters were aimed at geographical variability of *Larix* and especially provenance trials. Russian researches report on some results of larch provenance trial studies in different regions: on the Kola peninsula in North-West Russia (presentation of V. F. Tsvetkov and poster of A. L. Fedorkov), in the Central forest-steppe of Russia (R. I. Deruzhkin, V. M. Maksimov, V. P. Popov), in southern taiga of Central Siberia (G. S. Varaksin, L. I. Milyutin), in the Krasnoyarsk forest-steppe (T. N. Novikova, L. I. Milyutin), in Zabaikalje (V. P. Bobrinev, V. P. Makarov). A new approach to provenance trial study and seed transfer was offered by scientists from USA (G. E. Rehfeldt), Russia (N. M. Tchebakova) and Canada (L. K. Barnhardt). Their paper "Climatic transfer distances as descriptors of growth and survival of Siberian larch populations in Alberta (Canada)" showed the possibility of growth, modelling and surviving of trees in provenance trials, and seed transfer in dependence on climatic factors, too.

A well illustrated report of B. Jaquish (Canada) "The genetics and breeding of Western larch in British Columbia" was of great interest. The author presented some results of development of Western larch (*L. occidentalis*) program on tree improvement and genetic research.

Chairman of IUFRO Working Party S2. 02-07 "Larch genetics and breeding" O. Martinsson (Sweden) presented plenary lecture on international cooperation on larch activities. In O. Martinsson's opinion four important fields for international cooperation can be distinguished: 1) using and developing the Russian wood stock of larch; 2) larch regeneration in NW Russia and western Europe; 3) genetic variation and genotype-habitat interaction of larch; 4) silviculture of larch.

T. Eystensson (Iceland) in his report "Indoor breeding and seed production of Siberian larch" presented some results of breeding experiments with *L. sibirica*. The problems of biochemical polymorphism of *Larix* were discussed in a number of posters: A. Ya. Larionova "Population structure, gene diversity and differentiation of natural populations of *Larix sibirica* Ledeb. and *L. sukaczewii* Dylis"; Z. Kh. Shigapov, K. A. Urazbakhtina "Genetic structure of *Larix sukaczewii* Dylis in the Urals"; A. Sh. Timeryanov "Population structure of *Larix sukaczewii* in the Southern Urals". Except E. N. Muratova's paper larch karyological polymorphism was consedered in the posters of G. G. Farukshina "Karyological investigation of *Larix sukaczewii* in the Urals"; N. A. Kalashnik and T. G. Khaidarova "The study of chromo-

some nuclear organizers of Sukachev larch under air pollution".

The paper of group of Russian scientists - Yu. M. Konstantinov, V. N. Shmakov, O. A. Vasilieva, E. Yu. Garnik, I. V. Morosova "Cell biology and molecular biology studies of genetic variability in *Larix sibirica* of Pribaikalie" was of great interest. They described obtaining, cultivation and molecular biological study of callus tissue from mature trees of *L. sibirica*. The usage of activities of some enzymes of antioxidant defence as genetic markers of oxidative stress tolerance in larch trees of different geographic populations was studied. In the authors opinion the present approach can be used to study genetic diversity in *L. sibirica* trees in order to reveal economically valuable traits of mitochondrial and nuclear and nuclear coding and development of the principles of creation of genotypes with improved characterisics with the methods of genetic and cellular engineering.

Many interesting reports and posters on the results of genetic and forest breeding investigations were also presented on Symposium. Some presentations of other themes were of great interest from forest genetics and breeding point of view. For example, in the paper of E. A. Vaganov (Russia) "*Larix* as the best inderect recorder of climate change in Siberia" results of dendroclimatic studies of *L. cajanderi* trees aged 670-700 years in Yakutia were given. Such papers as "Forests of *Larix sibirica* in the mountains of South Siberia: a climatic range and possible shifts under past and future climat change" (Tchebakova N. M. , Parfenova E. I. , Russia); "Comparative wood anatomy of Siberian *Larix* species" (Benkova V. E. , Nekrasova A. A. , Russia); "Morphological and biochemical features of hypothermic adaptation of *Larix gmelinii*" (Milyutina I. L. , Sudachkova N. E. , Semenova G. P. , Russia) and many other reports were of great interest, too.

Symposium was well-organized and scientifically significant, from both national and international perspectives. Prior to Symposium, the book of abstracts was published along with the participant list and contact information supplement. The most interesting reports will be prepared for publication. Publication of the book of Russian and Swedish scientists A. P. Abaimov, J. A. Lesinski, O. Martinsson, L. I. Milyutin "Variability and ecology of Siberian larch species". (Swedish University of Agricultural Sciences, Department of Silviculture, Reports, No. 43, Umea, 1998, 123 pp.) was a good present for Symposium.

The participants of symposium visited experimental station of V. N. Sukachev Institute "Pogorelski bor" and saw provenance trials of larch. Excursion to Krasnoyarsk hydropowerstation and larch forests of East Sayans low-mountains was organized. Some participants also went to the state reservation "Stolby" near Krasnoyarsk.

After Symposium 9 participants from Scandinavia had excursion during 5 days to Bratsk (North of Irkutsk region). They acquainted with *L. sibirica* stands of different ages and with technology of industrial production and complex processing of larch wood. Scientists from North America (B. Jaquish, Canada, and Rehfield, USA) had a travel to southern regions of Central Siberia. They visited larch forests in Khakasia, Tyva and West Sayans mountains where they saw and *Pinus sibirica* forests.

Larch Symposium made a great contribution to the studies of important forest forming *Larix* species.

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