

[粕屋演習林]Analysis of Genetic Characteristics of Forest Trees

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<https://doi.org/10.15017/1462091>

出版情報：演習林研究経過報告．昭和46年度，pp.80-84，1972．九州大学農学部附属演習林
バージョン：
権利関係：

粕 屋 演 習 林

林木育種に関する研究

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これは1971年9月20日から同年12月19日までの90日間、日本学術振興会外国人流動研究員として来日された韓国ソウル大学校農科大学教授玄信圭博士の報告書の写しである。

(宮島記)

Subject: Report On The Cooperation With Professor Hiroshi Miyajima On The Research of "Analysis Of Genetic Characteristics Of Forest Trees" At The Kyushu University.

Reporter: Sin Kyu Hyun, Visiting Scientist.

During 90 days staying in Japan, the major part of time was spent with Professor Hiroshi Miyajima cooperating with him for his research on "Analysis of Genetic Characteristics of Forest Trees".

31 days were spent for taking trips to Hokkaido, Kanto, Kansai, Shikoku and Kyushu to observe the forest genetics research works which are being carried out by various research institutions.

3 days were allocated to conduct a series of special lecture for the graduate students at the Department of Forestry on Recent Advancement in Selection, Hybridization and Rooting Physiology of Forest Trees.

One special lecture was also given at the Annual Meeting of Kyushu Branch of Japan Forestry Society held at the Kyushu University on "Recent Achievements in Forest Genetics Research in Abroad".

In cooperation with Professor Miyajima, frequent discussions were made with him on the research programmes of his group at the Forest Genetics Research Center of the Kyushu University Forests along with visitings of the Research Center.

As the result of the cooperation with Professor Miyajima for the research on "Analysis of Genetic Characteristics of Forest Trees", following recommendations were made.

1. On Researches of Breeding Cryptomeria.

1). Inter-clonal Hybridization of Cryptomeria.

Taking advantage of the existing Breeding Arboretum at the Forest Genetics Research Center which is consisted of principal clones of Cryptomeria, hybridization between the clones of genotypic difference with a view of obtaining heterosis as well as improving various existing defects of each clones are thought to be highly recommendable.

It is particularly recommended for this hybridization programme to involve the YAKUSUGI which is known as a race-complex of Cryptomeria of excellent growth performance and insect resistance.

2). Hybridization Between Cryptomeria Elite Trees.

At the end of the joint research project of six universities in Kyushu on the progeny test of 25 elite trees selected from the Cryptomeria clone complex plantations in Kyushu area, hybridization between the proven elite trees is to be made to find out outstanding individuals among the hybrid progenies and to breed those to new clones of superior characteristics.

3). Hybridization Between Families of Different Natural Forests of Cryptomeria.

Taking advantage of the clone bank of families of principal Cryptomeria natural forests of various part of the country which will be established at the Forest Genetics Research Center of the Kyushu University Forests for a performance of a joint research project of several universities and the National Institute of Genetics on the genetic studies of principal natural forests of Cryptomeria, hybridization between families of different natural forests is recommended to be carried out to find out superior individuals among the hybrid progenies and to create new clones of Cryptomeria of superior characteristics.

2. On Research of Intraspecies Hybridization of Chamaecyparis.

1). Hybridization Among Elite Trees Selected in Kyushu.

Taking advantage of the HINOKI clone bank represented by 30 elite trees selected in Kyushu which is established at the Forest Genetics Research Center of the Kyushu University Forests, hybridization among those clones to find out prominent heterosis as well as outstanding hybrids in which desirable characters of parent trees are combined and breeding those to be new clones are considered to be an important theme of research.

2). Preservation of Gene Pool of HINOKI and Hybridization Among Individuals Selected from

those Gene Pools.

In view of continuing exploitation of intact natural HINOKI forests, an urgent research action selecting natural HINOKI forests which are remained not much interrupted at various site conditions in various part of the country and preserving those forests as gene pools is to be taken, and hybridization between genotypes selected at will from those gene pools to create new clones of outstanding characteristics is recommended as the research project of the highest priority.

3. On Interspecies Hybridization of Chamaecyparis.

In the light of the fact that some elite trees of HINOKI has been proven as a natural hybrid between C. obtusa and C. pisifera suggesting a high possibility of occurring of heterosis by interspecies hybridization of Chamaecyparis, researches on following subjects are recommended to be carried out.

1). Hybridization between C. obtusa and C. pisifera.

Heterosis in growth and resistance to root rot are expected.

2). Hybridization between C. obtusa and C. Formosensis.

Heterosis in growth, root rot resistance and heat hardiness are expected.

3). Hybridization between C. obtusa and C. lawsoniana.

Heterosis in growth rate, root rot resistance and cold hardiness are expected.

4. On the Research of Breeding Pines.

In accordance with the increasing demand of raw timber material such as pulp wood in particular, researches on pine breeding are also highly recommended.

1). Intraspecies Hybridization of Pines.

Referring to the research achievements made so far in home and in abroad that the amount of resin exudation affect the pine bark beetle and that the amount of resin exudation has a positive genetic correlation with growth rate, selection of

individuals of high ability of resin exudation from the famous geographical races of Pinus densiflora such as KIRISHIMA AKAMATSU and Pinus thunbergii such as MODOMATSU, and hybridization between the selected trees within each species to find out the combinations revealing the highest combining ability in resin exudation might bring about hybrids which are resistant to pine bark beetles which cause serious damages in Kyushu.

And, the mass production of those hybrid seeds can be accomplished through several Mono Clone Seed Orchards in which mono clone of two selected individuals are mix-planted in pair.

And, as means of expediting progeny test for resin exudation ability, the Mini-chip Method using juvenile progenies based on the high Juvenile-Adult correlation in resin exudation in pines is recommended.

2). Interspecific Hybridization in Pines.

a. Hybridization between P. densiflora and P. thunbergii.

With a view to obtain a heterosis in growth rate and in bark beetle resistance, hybridization between P. densiflora and P. thunbergii using the individuals of both species of high ability of resin exudation selected from the above mentioned famous races of each species is recommended.

And, mono clone seed orchard in which each one selected clone of parental species is mix-planted can also be adopted for mass producing interspecies hybrid seeds.

b. Hybridization between P. taeda and P. rigida.

Referring to the fact that P. taeda is resistant to bark beetle but susceptible to wind damage having a shallow root system and P. rigida is also resistant to bark beetle and resistant to wind damage having deep root system, the hybrid between the two species might be proven as valuable bearing both insect resistance and wind-firmness, and research on hybridization between those two species is recommended.

Along with above mentioned hybridization research, research on developing advanced generation of hybrid population through reciprocal recurrent selection is to be simultaneously carried out.

Acknowledgement:

The visiting scientist wishes to express his heartfelt thanks to the authorities of the Japan Society for the Promotion of Science for their generousness providing him with an excellent opportunity of staying in Japan for 90 days enabling him to make an efficient research in forest genetics with the cooperation of forest genetics research group at Kyushu University and to get a closer acquaintance with many capable forest geneticists in various part of Japan, thus creating a friendly link between Japan and Korea in the field of forest sciences.

The visiting scientist also wishes to extend his sincere appreciation to Professor T. Shioya at the Kyushu University for his kind suggestions and guidances offered in conducting the cooperative research throughout the entire period, and a deep appreciation is also extended to Professor Hiroshi Miyajima who has made every efforts to make the cooperative research a fruitful one.

The visiting scientist owes very much to many persons at Kyushu University, Dr. Y. Miyazaki in particular for his kindness guiding the trip to Hokkaido and discussing the research programmes at the Forest Genetics Research Center of the Kyushu University Forests, and to many persons of research institutions which were visited to those persons the warm gratitudes of the visiting scientist are extended.

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