

December 14, 2011

For Immediate Release

Sumitomo Forestry Co., Ltd.

**Saplings Successfully Grow from Rikuzentakata City's
"Pine Tree of Hope"
Preserving Young Trees for Future Generations**

Sumitomo Forestry Co., Ltd. (President and Representative Director: Akira Ichikawa; Head Office: Chiyoda-ku, Tokyo) and Sumitomo Forestry Landscaping Co., Ltd. (President: Yasuyuki Yamamoto; Head Office: Nakano-ku, Tokyo) have succeeded in using grafting and seeds to grow saplings from the "Pine Tree of Hope," the lone surviving tree of the Takata Matsubara coastal pine forest in Rikuzentakata City, Iwate Prefecture.

The Pine Tree of Hope is the only Takata Matsubara tree to survive the Great East Japan Earthquake and resulting tsunami. Upon a request from the Iwate branch of the Japan Landscape Contractors Association (JLCA Iwate), Sumitomo Forestry Tsukuba Research Institute and Sumitomo Forestry Landscaping to grow new trees from the Pine Tree of Hope and to conduct a chemical analysis of its trunk, the two organizations set about preserving actual genetic material from the tree through clone propagation, using grafting, cutting and tissue culture techniques, and preserving the lineage of the tree by growing saplings from seeds. Sumitomo Forestry Group applied seedling production technologies developed and accumulated through its plantation forest, greening operations and such projects as the cloning of historically important cherry trees. The researchers successfully cloned three saplings using the grafting techniques and cultivated 18 saplings from the seeds. The Sumitomo Forestry Group will continue to look after the saplings as they grow and cultivate even more trees from them as a way to assist the reconstruction of Rikuzentakata City.

■ Background to Formation of a Project Team

On March 11, 2011, around 70,000 pine trees constituting the famed Takata Matsubara coastal pine forest disappeared, leaving behind a sole survivor. This lone pine became a symbol of hope not only for citizens of Rikuzentakata City, but also for many others affected by the earthquake and tsunami. It became known as the "Pine Tree of Hope."

The pine tree is of the species known as *aiguro*, a hybrid between the Japanese red pine and Japanese black pine. The tree is said to be more than 200 years old. But while it survived, the Pine Tree of Hope did not go unscathed. Submersion in seawater for more than 10 hours and damage to the trunk caused by tsunami debris left it in a very critical condition. The tree was expected to be very weak. A project team was therefore set up to save the Pine Tree of Hope and use it to grow new trees.

Project Team Formation

On April 22, JLCA Iwate was instrumental in calling up 57 experts from garden landscaping and other firms in response to a request for assistance from Rikuzentakata City. A project team was formed comprising three separate teams: a "survey team" to study the tree's condition and recommend a suitable course of action; a "work team" to implement the course of action recommended by the survey team; and a "new tree cultivation team" to grow new trees to survive the lone pine. From the Sumitomo Forestry Group, two researchers from the Sumitomo Forestry Tsukuba Research Institute and three experts from Sumitomo Forestry Landscaping joined the new tree cultivation team. Besides Sumitomo Forestry

Landscaping being a JLCA member, the Group was requested to participate based on past recognition for its use of plant tissue culture and other techniques to breed saplings of endangered heritage trees, such as very old cherry trees. The Group wished to take part to the project to contribute in raising new trees to survive the Pine Tree of Hope.

■ Growing New Trees from the Lone Pine

Branches from the lone pine were collected on April 22 and efforts to grow new trees by cloning and from seeds began.

(1) Using Cloning Techniques to Grow New Trees

Cloning techniques such as grafting, cutting and tissue culture were carried out in the hope that the actual Pine Tree of Hope would survive in part. Grafting was successful and those saplings are now growing well.

Cutting and tissue culture did produce new buds, but unfortunately they did not survive. While there are examples of cutting success with young pine trees, the process for old trees is not so reliable and a sufficient method has yet to be developed. There are no successful examples of cloning by tissue culture anywhere in the world and it is hoped that methods will be developed.

(2) Growing Saplings from Seeds

Seeds were taken from the pine cones remaining on the tree and cultivated.

Apr. 2011: - Remaining pine cones were collected from the lone pine.

- The pine cones were taken to the Sumitomo Forestry Tsukuba Research Institute and closely inspected. Most of the seeds had already been released and no seeds were found where they are usually located. On further inspection, seeds that could not be released were found inside the base of the pine cones. The cones were carefully taken apart and the seeds removed. A total of 25 seeds were retrieved. Three seeds were sown as a test but there was no sign of germination.
- The failure to germinate was likely due to incomplete seeds or because they had not yet woken from hibernation. Low-temperature treatment at 4°C was carried out (for approx. six months).

Sept. 2011: - The seeds were removed from refrigeration after six months. Five seeds were test-sown inside a petri dish and grown inside a phytotron (a facility with controlled lighting, temperature and humidity used for plant experiments). Roots and buds were observed after two weeks.

Nov. 2011: - The germinated seeds grew well even when transplanted to nursery soil. The remaining 17 seeds were sown and 13 germinated.

Dec. 2011: - A total of 21 saplings were successfully grown: three cloned by grafting and 18 grown from seeds.

■ Salt Analysis Inside the Tree Trunk

To shed light on how much seawater was absorbed by the Pine Tree of Hope and predict its effects, a salt analysis of the trunk of the tree was carried out. This involved extracting the components inside branches and leaves collected from the tree and using analysis equipment called an ion chromatography system. For comparison, the salt content of foliage taken from pine trees growing along the coasts of Iwate and Chiba prefectures and pine trees from inland Tsukuba City were analyzed and archive data was gathered.

It was ascertained that the Pine Tree of Hope had most likely not absorbed the salt and as such the effects of salt would be minimum. While it is unfortunate that the Pine Tree of Hope will inevitably die, the analysis findings suggest it is dying not from salt but due to rotten roots caused by submersion in water for a long period.

■ Further Initiatives

(1) Saplings from the Pine Tree of Hope

As the Pine Tree of Hope likely has rotten roots and will not survive, efforts to save the tree itself have been called off. However, the Sumitomo Group will grow the cloned saplings and saplings cultivated from the seed as rays of hope on behalf of Rikuzentakata City. Our hope is that the trees will in the future become symbols of the city's reconstruction.

(2) Pine propagation techniques

Besides the current project, the Sumitomo Forestry Group is receiving more and more requests for preservation and propagation of heritage pine trees. The Group plans to continue efforts to develop methods for propagation using cutting and tissue culture techniques.

Terminology

* Cutting: A method of propagating plants by cutting off a branch or stem of the plant and planting it in soil for it to take root.

* Grafting: A method of propagation that involves cutting off a branch of the plant and joining it to the trunk of a separate plant of the same or a closely related species. The root part is known as the "rootstock," the attached part as the "scion."

* Plant tissue culture:

Techniques used to cultivate a plant by planting plant tissue in a culture medium, containing the nutrients required for it to grow, inside an airtight sterilized space, such as a glass vessel. Methods include stem-tip culture and embryo culture.

* Sumitomo Forestry Tsukuba Research Institute:

Established within the Tsukuba Science City in Tsukuba, Ibaraki Prefecture, in 1991 to carry out broad research and development with the objective of making more effective use of wood in a wide range of fields. With a focus on three areas—resources, materials and housing—and sights set on a recycling-oriented society, the facility explores the potential of wood as a material, delving into a variety of themes, including research into wood materials for more appealing houses, effective use of resources, and research and development related to the creation of comfortable living environments. The Tsukuba Research Institute also has two attached facilities supporting commercialization of the latest technologies: the Techno Center, which tests and verifies the quality of housing materials and various other materials, and the Wood and Housing Technical Data Center, which gathers together research findings and technical data for making available at the right opportunity.