Pine Genome Initiative

Unlocking the Secrets of the Pine Genome — the Key to Healthier Forests

The Pine Genome Initiative will use the revolutionary tools of genomics to:

1. **Develop a comprehensive understanding of the Pine Genome.**

2. **Increase our knowledge of the molecular processes that control ecologic and economic traits in pine and other coniferous forest trees.**

Why undertake this scientific effort?

Understanding the pine genome will have multiple benefits. It will lead to fundamental new discoveries and technologies to:

- Ensure healthier forests and more sustainable forestry practices

- Enhance capacity to sequester carbon and lessen global climate change

- Promote development of renewable bio-based products, including bio-fuels

- Improve the competitiveness of U.S. forest products and related industries

- Broaden trees' ability to withstand environmental stresses and invasive pests

- Revolutionize/accelerate breeding of forest trees

- Restore environmentally sensitive forests and endangered tree species

- Uncover mechanisms that enable trees to be among the most abundant, largest and longest lived organisms

- Compare ancient gymnosperm with modern angiosperm plants to explain the long-term ecological success of pines

- Obtain insight into plant evolution

Over the past six decades, using conventional breeding techniques, scientists have successfully improved strains of conifers to produce straight, fast growing trees for commercial use and trees that are genetically resistant to common tree diseases and insects. By unlocking the pine genome, we can accelerate the selection process and discover new ways to capture the ecological and economic value contained in the genetic information. For example, a recent study of the rice genome identified a gene that limited the production of grain heads. Silencing that gene by hybridizing selected lines of rice has significantly increased grain yields. Similar results may be achieved in forest management by understanding the genome of pine and other conifers.

What is needed?

The Pine Genome Initiative envisions a joint effort of competitive grants programs administered through existing federal agencies to achieve the goals of this program. To be successful, funding $10 million in the first year and at $30 million per year for each of four years will be required.

Why Pine?

Understanding the biology of pines and other important commercial conifer species in the United States is essential to maintaining the nation's competitiveness in the global forest products market. With well over 1 billion pines and other conifers planted annually in the U.S., it is expected these plantations will provide about 70 percent of the U.S. timber supply by 2040. Even today, timber has the highest annual farm gate value of any crop other than corn. In addition, pines and other conifers are:

- Environmentally important in fast growing plantations for carbon sequestration;

- Ecologically important because of their broad geographic range and their ability to occupy soils that range from degraded to highly fertile;

- Have large genome sizes;

- Are high in cellulose and lignin content which are the two most abundant macromolecules in the biosphere.

The emphasis on unlocking the pine and other conifer genomes has advocates throughout the world. The reason is that an accomplishment in any coniferous forest-tree species will have application to other conifers. Scientific expertise and collaboration for the envisioned effort is being offered from countries such as Canada, Argentina, Brazil, Chile, Uruguay, Australia, New Zealand, and regions from Asia, Southern Africa, Europe and Scandinavia.

Who are we?

The Pine Genome Initiative is a coalition of scientists and experts from more than thirty five universities, state and federal government agencies, forest landowners and forest products companies across the United States.

For more information on the Pine Genome Initiative visit *www.pinegenomeinitiative.org*

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