New technique to help pine forests adapt to climate change, bioenergy use

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A breakthrough in pine tree breeding will lead to forests better adapted to climate change and bioenergy use, University of Florida researchers report.

The improved forests will stem from a genetic technique the researchers have developed that can create new tree varieties in half the time it takes current breeding methods.

The technique, detailed in a study published online Wednesday by the journal New Phytologist, is expected to increase the security and competitiveness of the U.S. forestry industry.

The Southeast is a leading producer of the world's pine, and in Florida alone, the forestry industry had an economic impact of more than $14 billion on the state's economy in 2009 and provided more than 80,000 jobs. Pine is used for building materials, furniture and paper.

Before the development, creating a new pine variety took more than 13 years. Now, with the new technique, the estimated time is about six years. The savings to the forestry industry are expected to be substantial.

"Competitiveness is a critical element right now," said Matias Kirst, an associate professor in UF's school of forest resources and conservation and an author of the study.

"We are under very significant pressure from countries in the world

where there's perhaps less regulation, where there's higher photosynthetic capacity and the trees grow more," he said. "So we have to have the ability to breed more rapidly."

The finding came when the researchers, who are members of UF's Institute of Food and Agricultural Sciences, decided to bypass uncovering every bit of genetic code behind pine tree traits. Instead they used the parts of the genetic code they already knew to develop a trait prediction model.

The model allows the researchers to predict with great accuracy traits that will appear in a tree without having to first grow it in a field test, which can take about eight years.
Kirst said a large part of the technique's value is in breeding trees that perform well in the face of climate change, including conditions such as higher temperatures and increased drought.

"Breeders want to be in a position where the genetic material that they use is adaptable to a broad range of conditions," he said.

Gary Peter, a professor in UF's school of forest resources and conservation and another study author, said the new method will also enable faster development of trees that can be used for bioenergy, or energy produced from renewable resources.

"If we can modify traits much faster, we can create more specialized trees that can be grown for different products than just pulp and paper and solid wood," Peter said. "We can tailor them for energy conversion."

The new technique will also allow for the speedier development of trees with improved traits such as better wood quality and disease and pest resistance.