FORESTRY

New Kind Of Green Gold

Man is now making new kinds of trees. The Forest Service's Institute of Forest Genetics is breeding trees to grow faster, to be resistant to disease and drought.

By NEIL HUNTER

➤ MAN IS now making new kinds of trees. The old, established kinds don't suit him any more. They grow too slowly, or they have too many branches, or they succumb too easily to disease or drought.

So man has started to create trees which will not have such failings. During the 1940's we produced 12 new varieties of pine alone.

The U. S. Forest Service says: "Soon there will be hybrid trees that may grow to harvesting size in one half or one third the time required for a good non-hybrid timber tree to reach the same size. Our forests and farm wood lots might then be made to produce twice or three times the volume of timber that would be produced by planting standard stock or by natural growth."

There is no exact tabulation of the dollar value of the lumber production of the United States, but it runs certainly to several hundred million dollars. To double it is to add several hundred million dollars to our national income. The significance of the new development is thus difficult to exaggerate. The Mecca of this work is the Institute of Forest Genetics of the U. S. Forest Service, in Placerville, Calif. More than 60 different species of pine are now growing on the 106 acres of Institute grounds. It is exciting to walk around the Institute. In long rows, lodge-pole pines six years old reached just above my knees. But growing next to these rows were the new hybrids. The same age as the parent species, they towered four inches above my head.

Dust Pollen, Then Collect Seeds

To create a new tree by controlled breeding the tree scientist selects the pollen from a desired pine, dusts it on the conelets of the tree he wants to use as the "mother," and, in time, collects and plants the fertilized seeds. From these seeds the new hybrids sprout. Many hybrid plants will not reproduce themselves. But among all the hybrids produced to date in the tree laboratories of the world, every one has reproduced itself when old enough.

Merely placing the pollen of one tree on the conelet of another sounds easy. In fact, this breeding is intricate work. Since only the desired pollen may reach the conelet to be bred, the conelets of the chosen tree must be covered with bags to exclude all air-borne pollen. And since pollen, like smoke, gets in everywhere, the bags must be fine enough to keep foreign pollen out, but porous enough to allow moisture to evaporate. Each bag has a transparent plastic window, and is lashed to the branch with cotton cord over cotton batting.

Placing the bags over the branches of a tall pine is no mean feat. The men cannot use spikes lest their repeated journeys up and down a tree injure its bark. So they climb up ropes with monkey-like speed, using what they term a "footlock."

The Placerville experiments stem back two decades. In the early 1920's, James G. Eddy, a successful lumber man in Seattle, became worried because the nation was cutting its forests faster than they could grow back. Was it possible, he wondered, to develop trees which would grow fast enough to make up the difference—trees which would come to harvestable maturity in 50 years, instead of 75?

Mr. Eddy went to Luther Burbank, whose achievements in developing new types of flowers and vegetables were then headline news. After some study, Burbank responded with enthusiasm: there seemed no reason why trees could not be crossed and bred for improvement in certain qualities.

So Mr. Eddy started clearing land and collecting tree specimens. He and his associates chose Placerville after studying climate, soil, altitude and accessibility of sites all over the nation. They realized they would have to narrow the huge field of possible research and chose pines, because there are 90 definite species, and they grow from sea level to 10,000 feet, from the tropics to the Arctic Circle, in giant size and in shrublike bushes. Also, their commercial importance is outstanding.

They chose fast growth as their goal because economically that seemed to be the most urgent factor. In 1935 Mr. Eddy deeded over the entire project to the people of the United States. The U. S. Forest Service administers the program, to insure its long-range continuity.

Work Repeated to Eliminate Chance

In Supervisor F. I. Righter's office at the Institute large charts, squared off into all the possible hybrids or cross-breedings of the 64 varieties of pine on the experimental station, show a tally of 23% success, which in this work is high. But whether the cross is a success or a failure the process is repeated several times to eliminate chance.

What does "success" mean? One hybrid at three years is more than twice as high and three times as heavy as the better of its parent species. And this ratio continues; at ten years the parent species are six feet, the hybrid 12 feet tall. Crossing the poorly formed jack pine of the Lake States with

FAST-GROWING HYBRID—Although these three trees are each four years old, the hybrid in the center shows the fastest growth. It is a cross between the Jeffrey pine on the left and the Coulter pine on the right.

the straight-growing lodge-pole pine of the Sierras produces a newcomer as straight as the lodgepole but with 88% faster growth at 10 years of age.

As do all hybrids, vegetable and animal, hybrid trees assume an increase in vigor when the cross-breeding is successful. At four and one-half years, the cut-off top of a large but not the largest hybrid weighed three and a quarter times more than the better parent.

Branch-Free Trees

But fast growth is only one of the benefits of controlled tree breeding. For many lumber uses and for veneers and plywood, wood free from knots is desired. The fewer the branches on the trees the better. There are young trees at Placerville which are almost entirely devoid of branches. One Canary Island pine put up a trunk 15 feet 8 inches high, in three years, without a single side branch breaking its sheer, pipe-like column.

By careful selection, geneticists now develop trees which can withstand the age-old enemies of our forests. The pine reproduction weevil kills young trees in incredible quantities. Of one planting in Lassen National Forest it killed 95% of a stand of 15-year-olds. But a backcross of Jeffrey pine and Coulter pine laughs at the weevil and has improved wood qualities. (A backcross is a straight cross followed by a cross between the hybrid and one parent.)

Against another enemy — drought — the new hybrids are making headway. The knobcone pine and the Monterey pine of the West make a splendid pair. Their progeny combine in remarkable degree the drought-resistant ability of the knobcone pine with the fast growth of the Monterey. At 22 years it grows to more than 70 feet. On the Institute's nursery grounds, I was shown an experimental baby tree which promises to be proof against the dryest weather. A year-old hybrid pine, Ponderosa-Apache, stood only a couple of inches high but its root system already went 36 inches into the earth.

Rust-Free White Pine

Every year blister rust kills off unprotected young American white pines by the thousands. The annual cash loss to the lumber industry is tremendous. The Balkan white pine is resistant to rust. Crossed with the white pine, it produces a desirable hybrid apparently free from the rust menace.

This valuable discovery was made, in fact, not in Placerville, but in the Royal Botanical Gardens of Denmark, by Dr. C. Syrach-Larsen. It was in those Danish gardens that I first heard of our American Institute.

"Why do you come here," asked my guide, "when you in America are doing the most remarkable work of all nations?"

When I checked through the guest register at Placerville recently I found that in the preceding nine months, scientists had visited there from Italy, Sweden, Turkey, Finland, Greece, New Zealand, England, Israel, France, Japan, and South Africa.

Each nation is specializing in the kind of wood it needs most; Swedish scientists are working on aspen for paper pulp and pine for construction; the Danes on indoor techniques for dwarfing fruit trees, forcing early flowering and grafting imported scions on potted stock. Canada is deep in hybrid pine work, and poplar for pulp. Germany is doing research into speed of growth. Australia and New Zealand, which need trees, are interested in importing and acclimatizing foreign species.

The eventual aim of the experimenters is to get seed of the new type of tree into the hands of big planters for reforesting. The reforesting which goes on constantly in the United States is tremendous. One company reforests 5,000 acres a year, another has planted 90 square miles in Louisiana; members of the West Coast Lumbermen's Association plant up to 15,000 acres yearly in their certified tree farms.

Plantings With Wild Seeds

All this planting is being done with wild seed. No other has been available. Nor is the hybrid seed available in quantity now. "We're just about where the hybrid corn development was in the 1930's," said one Placerville scientist. "Principles and techniques have been worked out, a number of strains have been produced, and the next step is to make the seed available."

"If we have put forth so much effort to develop the desirable strains of one-year crops," said the late Director William Crocker of the Boyce Thompson Institute for Plant Research, "how much more attention should we give to developing the strains for crops like forest trees. The planting of a poor strain of an annual crop means the loss of only one year's investment. The planting of a poor strain of forest trees means the loss of 40 or more years' investment."

One of the top experts in the lumber industry calculates that the trees which are being brought into being at Placerville will cause an increase of $18,500,000 a year in the annual income from the certified West Coast tree farms alone. That is, of course, envisaging the day when the 3.7 million acres of those farms will have been planted in the new varieties.

The possible rewards to future generations of the Placerville experiments are such as to stir any imagination. Robert H. Dart, of Sacramento and Placerville, has known the west and trees for half a century, as cowboy, timber cruiser, and bigtime business manager in the fruit industry. He says:

"When FDR first proposed planting trees on the western plains, I classed the idea as a prime example of New Deal fantasy. Having for 25 years studied the work of the Institute, I am now convinced that great forests can be grown on the barren plains, and grown to commercial value in less than one human lifetime."

The yellow dust that is gold was discovered in 1848 just a few miles from Placerville. The town took its name from the rich placer mining that went on there. Pollen dust looks like a very fine gold dust. Many competent observers think that from the nation's point of view, Placerville's second yellow dust will be as rich as its first.

This article was prepared for SCIENCE NEWS LETTER *in cooperation with the Reader's Digest. It will appear shortly in that magazine.*

Science News Letter, July 7, 1951

INVENTION

Patent Suction Brush to Clean Venetian Blinds

➤ FOR THE housekeeper is a suction brush to clean venetian blinds. It is an attachment for the ordinary vacuum cleaner. This accessory has a jaw in which there are two brushes facing each other. The slat of the blind to be cleaned is put between them. The combination of the brushes and the suction assures efficient cleaning. Patent 2,558,253 was awarded to Julian M. Ines, Goshen, N. H., for this invention.

Science News Letter, July 7, 1951