FORESTRY

Ways To Fight Forest Fires

Advanced electronic gear, water bombs and cloud-seeding techniques are being tested to fight forest fires. One new device, an infrared "eye," detects fires at long range.

By EDWARD HOUSMAN

➤ NEW DEVICES are about to join the ranger at the nation's forest fire lines to fight blazes that annually consume $60,000,000 worth of timber.

Television, for instance, is moving to the forests of Louisiana in experiments by the state's forestry service. Remote TV cameras in towers are being built to scan huge woodland areas. The cameras send their pictures through closed circuits to ranger headquarters.

There, one ranger might be able to keep watch over four or five areas at once. Fires can be pinpointed by sighting them from two TV lookouts.

Surplus World War II bombers have been converted in tests to drop about 600 gallons of water from special quick-opening bomb bays. The water cascades down on critical points in a fire and can be dropped in two salvos of 300 gallons each. Smaller planes and helicopters equipped to drop paper bag water bombs are used in Canada's fight on woodland fires.

Further tests with the technique are being considered in this country. The packages, each holding about four gallons, are designed to keep smaller blazes under control until firefighters can reach the scene.

The latest and, according to forest fire experts, the most promising new device is an infrared "eye" fire-spotter.

One thing is sure about a forest fire—it is hot. The new device, developed by the Radio Corporation of America, takes advantage of this fact and spots a blaze by its heat. The system, in initial development stages, is being tested by the U.S. Department of Agriculture in woodlands near Washington, D.C.

"Sees" Through Smoke

The device can "see" through the overcast, fog and smoke that often obscure fires from view.

What you feel when you hold your hand to a fire or near a radiator are heat, or infrared, waves that have properties very similar to visible light, but are invisible. Their frequency is too low to be detected by the eye.

The new device can spot concentrations of infrared radiation from long distances and record their positions on a TV-like screen. The machine "sees" through overcast because infrared waves penetrate the haze.

The principle of the "snooperscope," a tube that converts infrared rays to visible light, is used in the device. Through such a tube, a man in a dark room detects objects by their heat. Variations of the snooperscope principle have been applied to a rifle attachment called the "sniperscope" used in World War II and Korean War night fighting.

It is reported that a similar system is the "eye" of a new guided missile that heads for the heat-center of its target.

Possible problems in applying the snooperscope to forest-fire fighting are being investigated. Foresters want to know whether the system is sensitive enough to pick up radiation from the hot air column that rises from a fire obscured by trees. They also want to know if the device is too sensitive, if it would set off false alarms by registering heat from rocks baking in the sun, heat from the sun itself or natural hot air currents.

The system may find extensive use in fire detection from the air and, if the system works well, the Agriculture Department expects to encourage development of airborne equipment. In a plane, the device could pinpoint a blaze over larger areas, even through the fire's own smoke, which sometimes obscures the blaze.

Other recent advances in scientific fire fighting include:

An incendiary pistol that can be fired from a helicopter or from the ground, with a 100-yard range, to burn away areas in a blaze that the fire has skipped has been developed.

Chemical Retards Bush Fires

Use of chemicals, such as monammonium phosphate, to retard bush fires has shown promise in U.S. Forest Service experiments. Wetted down with this substance, branches will char but will not burst into flame under ordinary conditions. Corrosion of equipment from the chemical, however, is a major limitation of the technique.

Scientists are also engaged in research on the characteristics of blazes and how they are affected by meteorological conditions.

Fires often burn calmly for days, seemingly under control, then suddenly burst into a fiery inferno, almost like an explosion. One explanation is that upper atmospheric layers temporarily damp the fire by preventing its column of hot air from ris-

AIR-BORNE RANGER—Helicopters are used to scout blazes and bring fire fighters to areas difficult to reach by foot. The Wheeler Springs fire shown here ran up damage and suppression costs in excess of $400,000 before it was brought under control. More than 25,000 acres of national forest and private land in California were burned during it.

ing. When the column pokes through the layer, the fire may blaze up anew.

Atmospheric damping is caused by inversion, or an overhanging layer of warm air above a cooler one. The same phenomenon stagnates smog gases near the earth's surface.

One outgrowth of such research is a cloud-seeding technique to reduce lightning flashes by breaking up the clouds before they can release their stored-up charges. Last year lightning started 7,780 forest fires.

Scientists at the California Department of Natural Resources reported they prevented an estimated 90 lightning fires in their extensive seeding experiments. In each operation, they seeded an average of 2,500 square miles of clouds. Work on the method continues.

Such devices and techniques may help the ranger but will probably not replace him.

Shovel, Ax and Hose

Forestry experts say the best fire fighting device is a man with a shovel, an ax and a hose. Two such men stop 85% of the fires. Another five percent of forest fires need slightly larger crews.

The remaining 10% of the blazes do 90% of the damage. These are the ones that get out of control and sometimes burn for months. In the United States, forest fires flare up at the rate of approximately 500 a day.

One fire that has been burning for months in the Okefinokee Swamp of Georgia is still stubbornly smoldering and flaring up in the peat. When weather conditions are right, it spreads to nearby woodlands. The area is now in its fourth year of drought and experts believe the fire will burn on until the water level rises from a season of heavy rains.

"Mule Tail Fire"

There are several stories of how the fire started. The most widely accepted version has given it the name of "Mule Tail Fire" in Forest Service circles.

It seems a group of men were collecting cups of gum rosin from pine trees, pouring the thick sap into a large barrel on a cart drawn by a mule. It was cold that day and they also had a fire burning in a bucket on the wagon to warm their hands.

Accidentally, the mule swung his tail into the fire. The animal careened off, leaping and kicking. It smashed the cart. The fire from the bucket spread to the rosin, the dry grass and the trees. It went out of control.

The story might not be true, but it has taken hold among fire fighters and is still told.

Most fires have simpler, less picturesque causes. Last year, careless smokers started 23,330 of the 176,891 fires. Trash and brush heap fires caused 30,318. Campers in patrolled woodlands caused 4,785.

The total area destroyed by fire in 1954 was 8,832,963 acres.

Incendiary fires ranked as the top offender. This category includes not only the small number set by firebugs, but those caused by persons on their own property to improve the soil and remove a large variety of pests, such as ticks and snakes. Purposely-started fires caused 40,520 woodland blazes in 1954.

No Aid to Soil

Forest experts point out that it is doubtful whether such burning helps the soil, and that the ticks and snakes return in a short time. At any rate, since incendiary fires are the top cause of woodland blazes, they do more harm than good, and foresters urge farmers to use the utmost care in controlling necessary fires.

Some people purposely start fires to create jobs for themselves.

The number of acres destroyed annually in fire has dropped over the past five years, even though more persons are using the nation's woodlands for recreation than ever before. Much credit for the decrease is given to drives, such as the Smokey Bear fire prevention campaign and the Keep Green programs, which continually remind persons to stamp out their cigarettes, quench their campfires and break matches before throwing them away.

The forest fire season is now upon us and people are warned to be careful in using our valuable woodlands. Ninety percent of the fires are man-caused.

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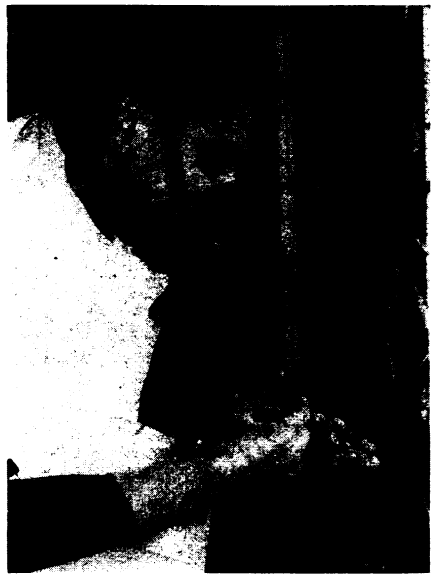

RADIOACTIVE FUNGUS — Ara Paul of Argonne National Laboratory injects the florets of radioactive rye plants with a culture of the fungus, Claviceps purpurea. *The rye was planted in a sealed greenhouse with radioactive carbon dioxide to make all its products radioactive. Spur-like projections will develop at the injection site.*

TECHNOLOGY

Portable Radiation Unit Invented for Field Use

➤ A PORTABLE radiation unit, for use in the field to induce mutations in plants, has been invented by three scientists from Brookhaven National Laboratory, Upton, N. Y.

Otto A. Kuhl, W. Ralph Singleton and Bernard Manowitz developed the small unit, which uses a cobalt source to expose plants to gamma rays. When not in use, the radioactive cobalt is housed in a one-ton steel and lead shield.

The unit can be produced for about $5,000, and can be used to cause genetic changes in plants. Some of these changes may be beneficial, creating the hybrid plants of tomorrow.

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BIOPHYSICS

Fungus Made Radioactive For Drug Research

➤ A RADIOACTIVE FORM of a fungus has been developed in "radioactive greenhouses" at the Argonne National Laboratory, Lemont, Ill.

The radioactive fungus ergot, and the drugs ergotamine and ergonovine to be extracted from it, will be used in medical and pharmaceutical research at the University of Connecticut.

Ergot drugs have been used in obstetrics for over a hundred years, and ergotamine is used in treatment of migraine headache. The radioactive forms permit scientists to look for new drugs from the fungus and, at the same time, to trace the action of the drugs on the body's nervous and muscular systems.

Working at the Argonne Laboratory, Ara Paul of the University of Connecticut, grew a variety of rye in sealed greenhouses containing radioactive carbon dioxide. This carbon dioxide was taken up into the rye plants, which in turn became radioactive.

As the plants were about to flower, the drug-producing parasitic fungus ergot, *Claviceps purpurea,* was placed on the rye heads.

The fungus spread quickly and grew on the rye. In one to two months dark-colored, spur-like projections emerged from the colonies. These projections, or sclerotia, are the drug-containing portion of the fungus, which now had become radioactive.

The research project is under the direction of Dr. Norbert J. Scully of the Argonne Laboratory and Dr. Arthur Schwarting of the School of Pharmacy, University of Connecticut.

Besides the ergot, radioactive tobacco, rubber, opium, digitalis, soybean, buckwheat and alfalfa have been developed using Argonne's radioactive greenhouses. The laboratory is operated for the U.S. Atomic Energy Commision by the University of Chicago.

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