LASER ATTACK

On Aquatic Weeds

AN OPERATIONAL MODEL of a laser beam is being built by the U. S. Army Corps of Engineers to continue testing its effectiveness for controlling aquatic weeds.

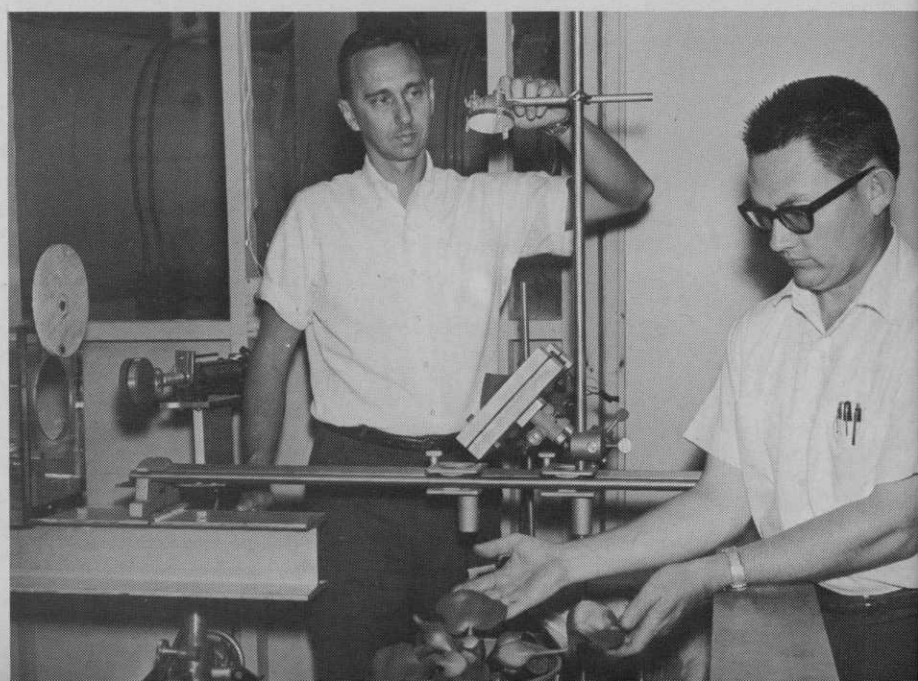
"We hope to begin field testing about the first of March or April," said Dr. Edward O. Gangstadt, who's in charge of the Corps' aquatic plant control research activities.

After two years' laboratory experimentation, the successful application of the laser beam for weed control looks "quite feasible by our estimates," said Gangstadt. How much further the project goes will be determined by the field test results gained in fiscal year 1971, he added.

The laser beam application was conceived by Dr. Gangstadt's predecessor, Dr. Ralph A. Scott, Jr., now with the Department of Defense. The process has been disclosed to the U. S. Patent Office, and Dr. Scott has signed a license granting exclusive use to the government, on a royalty-free basis.

Two types of lasers are being studied. One would be used for surface plants and the other for submersed and bottom-rooted plants. It is the surface-application laser that has reached the operational model stage.

A copper vapor laser for underwater applications still is in the laboratory stage of development but "looks rather promising," reported



Setting up an experiment to use the Army Missile Command's continuous wave carbon dioxide laser on a water hyacinth are physicist John Ehrlich, left, Physical Sciences Laboratory Research and Engineering Directorate, Army Missile Command, and Dr. Richard Couch, biologist from nearby Athens College, Athens, Ala. Lasers are being explored as a possible tool for exterminating aquatic weeds. The work at Redstone Arsenal is being performed for the Army Corps of Engineers.

Healthy water hyacinth at far left appears scorched after being exposed to laser beam. Photosynthesis is disrupted in some manner and the plant dies in 8 to 12 weeks.

Dr. Richard Couch, Athens College, Athens, Ala.

Development of practical equipment for using the laser is being done through the Corps of Engineers in coordination with the Army Missile Command and under contract with Athens College and Auburn University.

Laboratory tests in May of 1968 achieved desired results on aquatic weeds with 1,350 watts at 1.9 seconds exposure. More recent tests have produced immediate visible damage with 650 watts of power and .025 seconds of exposure.

The operational model is described as a carbon dioxide laser that will develop 10 kilowatts of power. The laser itself will be from one to two meters in length, said Dr. Gangstadt, or "about the size of an office desk," added Dr. Couch.

Component parts of the laser will come from the Redstone Arsenal. The laser is being put together at the Waterways Experiment Station at Vicksburg, Miss. It is to be mounted on an 8x30-ft barge. The power supply is similar to that used for WWII searchlights.

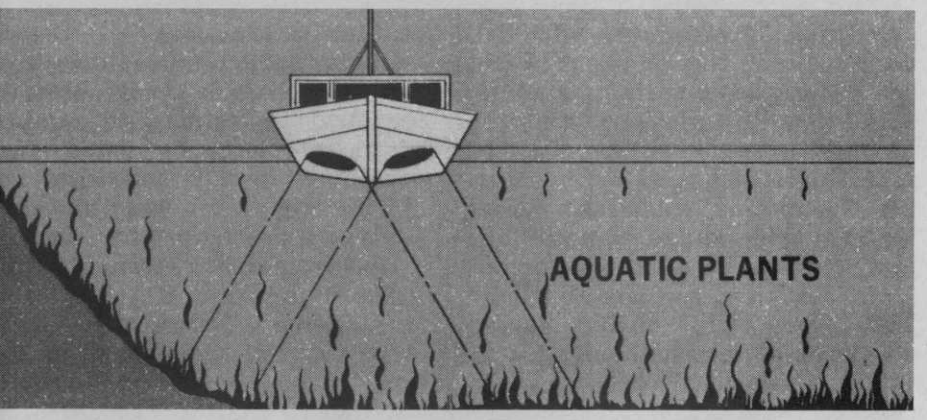
Although plants exposed to the laser appear to be scorched as though a blow torch had been passed over them, the heat doesn't produce the lethal response. The eradication method, states the patent, is "based upon the induction of phytotoxic system responses in plants subjected to laser energy."

"It appears the laser severely disrupts carbon dioxide fixation," said Dr. Couch. "There is pigment destruction, plants turn yellow, and they just don't propagate."

Inactivation of the enzymes in the systemic process is what apparently causes the death of the plant in 8 to 12 weeks.

Diffraction of the laser beam to spread it out to a width of one foot for plant application was achieved by using gold colloidal mirrors.

Project scientists believe the laser principle can be applied also to a variety of land weed control situations. They envision models that could be mounted on a boat, land vehicle, or carried by low-flying aircraft.



Work is being done in the laboratory on another type of laser for use against submersed aquatic weeds. An artist's concept of how a copper vapor laser might be employed is shown above. It conceivably could control submersed-suspended and bottom-rooted plants.