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An Artificial Climate Chamber for Investigating Crop Protection

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Translated from: Protection of Crops from Pests and Disease (USSR)
4: 6: 17-18, 1959.

~~This~~ apparatus was developed and constructed in the biophysics laboratory of the VIZR (All-Union Scientific Research Institute for the Protection of Crops). It consists of: (1) the phytotron - a chamber where experimental and other objects of investigation are placed; it is mounted with special lights and dagchiki* (word not known to translator) of the regulating device. 2) the conditioner - a unit for artificially creating the required climatic conditions. 3) a water supply facility; 4) a control panel. The volume of the chamber is 15 m³. There are shelves in it to hold the plants being tested, screened isolators for insects, etc. There is also a soil thermostat to maintain the plants, soil dwelling insects and microorganisms at the different temperatures.

Above and below, along the chamber's walls, are laid P-type air ducts connected to the conditioner. The air enters through the upper duct and is returned to the conditioner through the lower, according to its carbon dioxide content.

In this manner the required climatic conditions are created and maintained. Before the entrance is a vestibule where a faucet, sink, and bactericidal lamps are situated for disinfecting the clothing of those working with infectious pathogens of plant diseases.

The chamber is lighted with a set of lamps with mirror reflectors, luminescent and point mercury-quartz with super high pressure, that give a spectrum of ultraviolet radiation in a wide band of wave lengths.

Water filters are used to absorb the thermal infrared radiation that is harmful to plant life.

Such a combined lighting system was arranged for the chamber so the spectrum composition would be as near as possible to that of sunlight.

The chamber's ceiling is glass. The walls are made of panels mounted on a collapsible metal frame.

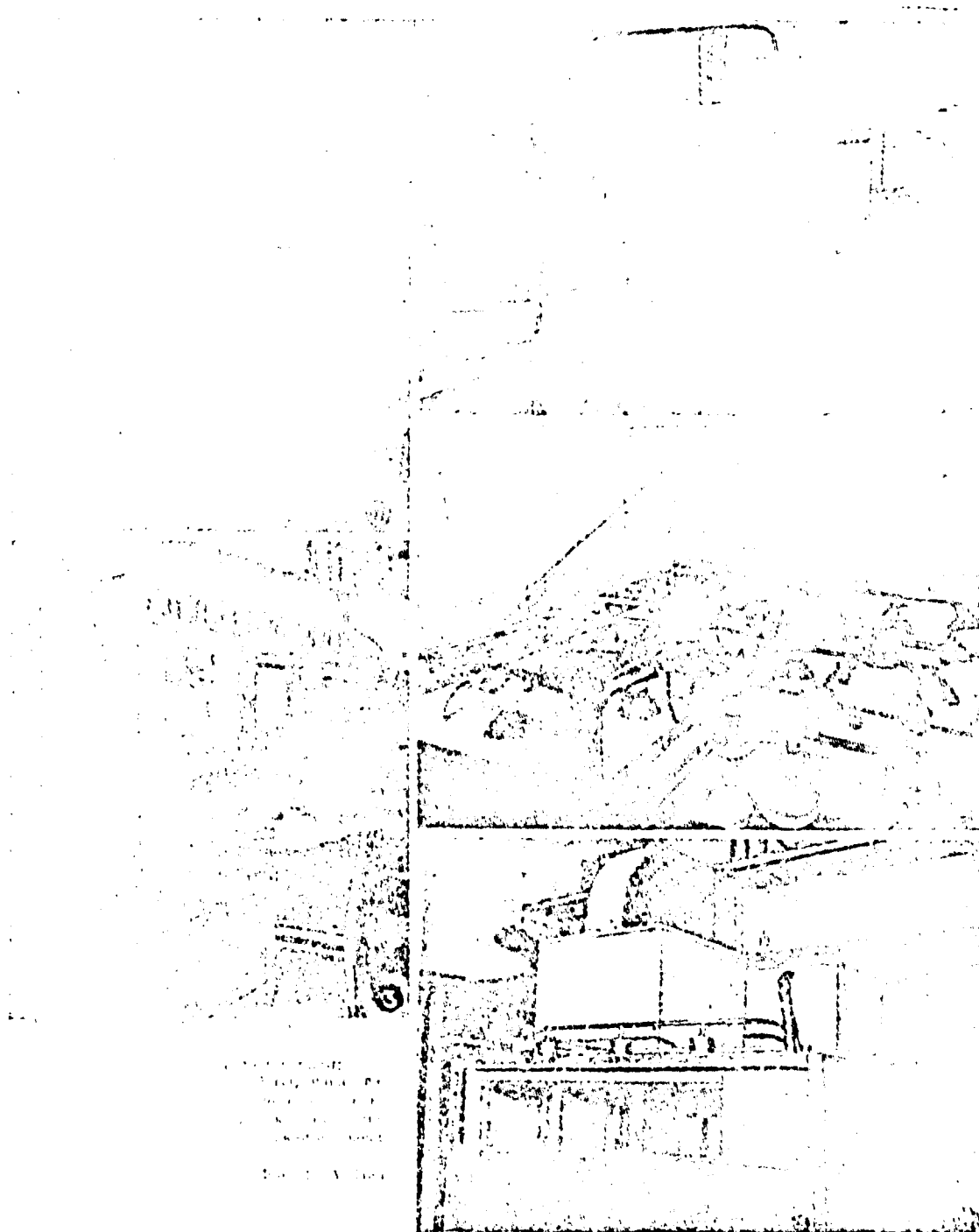
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The air entering the phytotron receives the required moisture and temperature in the conditioner, which contains a refrigerator condenser for air cooling, a fan, an air humidifier, and two electric heaters for heating the air passing through the conditioner and the water entering the atomizers of the humidifier. Temperature and humidity control are achieved by separate operation of the above facilities.

The air humidity can be regulated by changing the temperature of the water being supplied to the atomizers. The refrigerator, the electric heaters, the fan, and the pumps are controlled from the control board by a push button device. Here are located the control-measuring devices, by which it is possible to gauge the climatic parameters within the chamber, and also automatically regulate and maintain the given regimes.

The layout of these devices, which are based on the utilization of semiconductor thermoresistances, was also developed by the VIZR biophysics laboratory. In addition to the authors, M. A. Bergfeld, a coworker at the laboratory, also took part in the creation of the phytotron.



Artificial Climate Chamber

1. General view of the phytotron.
2. Interior view.
3. The control panel.
4. The glass ceiling of the chamber, above which are located the heating reflector lights.
5. The conditioner's tri-chamber humidifier with atomizers.