BRIEFS | short reports on current agricultural research

METABOLIC ALTERATIONS IN DISEASED PLANTS

ALTHOUGH EXCELLENT SOURCES of resistance to some plant diseases have been incorporated for some time into commercially used varieties, the physiological nature of resistance is unknown in most cases. Studies have been undertaken with two diseases, the Helminthosporium leafspot disease of corn and powdery mildew disease of barley, in an attempt to determine some of the metabolic disturbances that occur following penetration and during infection. It is hoped that a better understanding of the physiology of diseased plants will lead to a comprehension of the chemical basis of disease resistance.

Increased respiration has been noted in many plants following fungus infection. Respiration of mildewed leaves of barley may be as much as six or seven times that of normal leaves. Enzymatic studies using cell-free extracts of healthy and mildewed leaves of barley have been conducted in our laboratories to determine if the activity of some of the respiratory enzymes is affected by disease development.

The activity of two enzymes, glucose-6-phosphate dehydrogenase and 6-phosphogluconic acid dehydrogenase, was greatly increased in mildewed leaves. Increase in the activity of these two enzymes was noted at approximately the same time the first visible symptoms appeared. The activity of these two enzymes in mildewed leaves continued to increase with time and was approximately 300% of healthy leaves 10 days after inoculation.

It appears that much of the increased activity is due to enzymes contributed by the fungus, since washing the mildew off the leaves greatly reduces the activity of mildewed leaves. These findings agree with previous studies elsewhere indicating increased respiration in the mildewed leaf and altered carbohydrate metabolism. Respiratory increases in diseased corn have also been correlated with increases in the activity of key respiratory enzymes.

Decreased photosynthetic activity in diseased plants can be explained on the basis of a considerable decrease in the activity of some photosynthetic enzymes. In the Helminthosporium leafspot disease of corn, reduced activity of one of the enzymes involved in the photosynthetic carboxylation phase is not due primarily to enzyme decomposition. It appears that an enzyme inhibitor produced in diseased plants is mainly responsible for reduced activity. The inhibitory effect can be counteracted by the addition of chelating agents to the cell-free extract or by treatment of the extract with charcoal.

Other studies, involving levels of organic acids, amino acids, sugars and ribonucleic acid constituents in both healthy and diseased plants, have provided additional information about the metabolic alterations that occur in plants following infection.—*Isaac Malca, Assistant Research Plant Pathologist; F. P. Zscheile, Professor of Agronomy; R. C. Huffaker, Assistant Agronomist, University of California, Agricultural Experiment Station, Davis. This work has been supported by a research grant from the Herman Frasch Foundation.*

TV AIDS TEACHING AND RESEARCH AT SCHOOL OF VETERINARY MEDICINE, DAVIS

CLOSED-CIRCUIT TV within the classroom, as pictured above—or broadcast to several classrooms from a separate operating arena—offers teachers and researchers in the School of Veterinary Medicine, University of California, Davis, new opportunities for more effective presentation of detail in theory and practice of veterinary medicine to a much wider audience. A small section of the bone X ray on regular viewing box in center of photo above has been enlarged by Dr. T. J. Hage using the TV camera to right and is being viewed by students on two 24-inch TV screens, as indicated by the monitor to left. Formerly the 52 students had to be divided into two sections for a three-hour period, allowing each student to walk past the radiograph for closer observation. Instruction can originate in any of 12 rooms, but normally will come from one of three surgery rooms or two anatomy rooms. Monitors for viewing reception can be in the camera room, as above, or in any combination of the other 11 rooms—*Charles Nearing, Coordinator, Department of Educational Television, University of California, Davis.*