

THE EFFECT OF ULTRAVIOLET LIGHT ON THE GROWTH OF *HELMINTHOSPORIUM ORYZAE*

H. L. MONOSON and S. H. BUCK
Bradley University, Peoria, Illinois 61606

ABSTRACT. — *Helminthosporium oryzae* was grown on potato-dextrose agar and in potato-dextrose broth under near ultraviolet light. Increased growth of the fungus was noted with both media after the fungus had been exposed to near ultraviolet radiation. The increased growth rate was attributed to either a nuclear and cell division delay in the fungus caused by the radiation, a leakage of substances from killed cells, or the effect of near ultraviolet light on the medium.

Most fungal investigations have dealt with the effects of far ultraviolet light (1900-3000 Å) on the survival of spores, colony growth rates, and induced mutations. The majority of radiation studies have employed wavelength in the spectral range of about 2600 Å.

Relatively little work has been conducted on fungi with near ultraviolet light (3000-4000 Å). Leach (1961) and Honda (1968) reported on near ultraviolet light and how it affected the sporulation of *Helminthosporium oryzae* V. Breda de Haan. Leach (1961) stated that continuous exposure to near ultraviolet light caused an increased growth rate of the fungus in liquid media.

The goal of the present study was to examine the effect of near ultraviolet light on the hyphal growth of *H. oryzae*.

METHODS AND MATERIALS

An isolate of Leach's (1961) *H. oryzae* material was obtained from Dr. Yulchi Honda of Tohoku University, Sendai, Japan. All of the cultures used in the present study were maintained on 2% potato-dextrose agar (PDA) at 21°C ± 1°C with an initial pH of 5.7.

The inoculation procedures were identical to those employed by Leach (1961). Agar discs 3 mm-in-diameter were cut with a sterilized cork borer from the periphery of a mature colony growing on PDA. The inoculum plug was placed

face down in the center of a sterile 9 cm plastic petri dish that contained 25 ml of PDA or in Pyrex glass wide-mouth bottles that contained 50 ml of 2% potato-dextrose broth (PDB). Liquid and solid media cultures were maintained in the dark until the fungal colonies had attained a growth size of 0.75 cm-in-diameter. Cultures were irradiated 16 cm from the light source on a simple shaker reciprocating through a distance of ¼ of an inch at 85 times per minute. Near ultraviolet light exposure was obtained with four 20-watt GE Black Light lamps (BLB) that had 97% of the radiation between 3000-4000 Å. All cultures were returned to the dark after irradiation. Control cultures remained in the dark at all times. Five replicates of each application were made for all experiments.

Fungal growth on solid media was determined by radial colony diameter measurements in centimeters after six days. Liquid cultures were filtered through pre-weighed filter papers after the six day irradiation period. The filter papers were dried for 48 hrs at 100 C and then re-weighed for fungal dry weight determinations.

RESULTS

Fungal cultures exposed to BLB for six days on PDA showed a decreased amount of radial growth when compared to controls. The growth of similar cultures maintained in the dark after radiation exposure surpassed that exhibited by controls after four days of maintenance. The PDB cultures exposed to BLB had dry weight values that in two instances surpassed those of the controls.

DISCUSSION

The amount of increased growth in PDB cultures exposed to BLB was lower than that reported by Leach. A significant increase in fungal growth was

noted on experimental plates after their removal from the continuous BLB exposure. The increased growth was attributed to either: (1) a nuclear or cell division delay in the fungus induced by the radiation, (2) the leakage of growth promoting substances from cells killed by near ultraviolet light radiation that later caused an increased growth rate, or (3) the effect of near ultraviolet light on the medium.

ACKNOWLEDGMENTS

The authors wish to express sincere thanks to Dr. Y. Honda for a culture of the fungus and to the United States

Department of Agriculture for allowing work to be done with this plant pathogen.

LITERATURE CITED

- HONDA, Y., M. SAKOMOTO, and Y. ODA. 1968. Blue and near ultraviolet reversible photoaction on the sporulation of *Helminthosporium oryzae*. *Plant and Cell Physiol.* 9: 603-607.
- LEACH, C. M. 1961. The sporulation of *Helminthosporium oryzae* as affected by exposure to near ultraviolet radiation and dark periods. *Can. J. Bot.* 39: 705-715.

Manuscript received, July 7, 1969