STUDY OF SEED-BORNE PATHOGEN OF WHEAT AND RICE WITH PHOTOACOUSTIC SPECTROSCOPY

A. K. RAI, and J. P. SINGH, *Diagnostic and Instrumentation Analysis Laboratory, 205 Research Boulevard, Mississippi State University, Starkville, MS 39759-9734, USA*.

Six seed borne pathogens (dry spores) of wheat (Tilletia indica, Ustilago tritici, Helminthosporium sativum and Alternaria triticina) and rice (T.barclayana and Ustilaginoidea virens) were extracted from the seeds of infected wheat and rice. Photoacoustic (PA) spectra of dry spores of these pathogens were recorded in the wavelength range of 200 to 800 nm at modulation frequency 18 Hz, using an indigenous photoacoustic spectrometer. PA spectra of all pathogen show two strong bands at 232 and 292 nm, corresponding to the absorption by the aromatic amino acid in the protein. The intensity of the band at 292 nm (which is the characteristic absorption band of protein) is very strong in Tilletia indica and Helminthosporium, showing the protein concentration is large in these pathogens. The pattern of the intensity of these bands (l = 232 and 292 nm)is different in different pathogen, which clearly shows that different group of amino acids are participating in the synthesis of protein in these pathogens. By comparing the molar absorbtivity at 290 nm, of different amino acids (particularly phynylalanine, tyrosim and thystophan), tryptophan is dominating in the pathogen of Tilletia indica and Helminthosporium satiuum where as Ustilaginoidea virens and Ustilago tritici have less concentration of tryptophan. All six pathogen is characterized by their characteristic intensity pattern of these two bands. Apart from these bands, some extra peak characteristics for particular pathogens were also observed. The characteristic peak patterns and signal strength of different bands make the basis of differential diagnosis of the disease. In contrast to this, Conventional absorption spectra showed nearly similar band patterns and intensities of the bands were almost similar in all six pathogen. Thus PAS technique is proved to be useful for differential diagnosis of various seed borne pathogens of wheat and rice.