

Editorial

Serological versus molecular diagnosis

Diseases caused by viruses are a constant and major problem for crop and livestock production worldwide. The diseases range from highly contagious acute forms with high mortality, to chronic disabling ones with an insidious effect on production. Considerable efforts are needed to control these diseases including accurate and rapid diagnosis using both classical and emerging technologies. The methods used are mainly serological and molecular biological based methods based (Crowther, 1998).

Recent advances in biotechnology and molecular biology have played a significant role in the development of rapid, specific and sensitive assays for diagnosis. Serology provides a useful tool for monitoring diseases, physiological properties and routine testing in breeding programs. Monoclonal antibodies have been used to group viruses, and also to differentiate strains of viruses. Monoclonal antibodies have been found very useful for large-scale diagnosis of viral diseases and for elucidating the antigenic structure of plant viruses at the molecular level (Van Regenmortel, 1984). Among serological tools, ELISA has been the method of choice because of its high sensitivity, simplicity, reproducibility and versatility in screening a large number of specimens (Cho, 1990). The application of polymerase chain reaction (PCR) has now made it possible to amplify the low copy number of viral RNA/DNA molecules and their subsequent detection (For detailed review see Khan et al., 1998). PCR technology for the detection of DNA from various organisms may eventually replace some immunological assays.

In this issue of the African Journal of Biotechnology (pages 171-178), Agindotan et al. (2003) produced both monoclonal and polyclonal antibodies against a Nigerian isolate of banana streak virus (BSV). Their two monoclonal antibodies detected all isolates of BSV that were detected by the homologous mouse polyclonal antibodies. The two monoclonal antibodies also detected BSV in different asymptomatic and symptomatic clones of

plantains and bananas at the IITA (International Institute of Tropical Agriculture, Ibadan, Nigeria) *Musa* experimental fields. Reports using PCR in detection and diagnostics are numerous. This includes the diagnosis of trypanosome infections (Picozzi et al., 2002), and PCR identification of the *Fusarium* genus based on nuclear ribosomal-DNA sequence data (Abd-Elsalam et al., 2003).

New developments in molecular biology have generated exciting possibilities for improved diagnosis of plant and animal diseases. Through gene cloning and expression and peptide synthesis, defined parasite antigens can be produced in vitro for use in serodiagnosis, while nuclear hybridization techniques offer a vastly improved approach to identification of parasites in the tissue specimens of infected hosts as a means of diagnosis. With the development of murine hybridoma technology over a quarter century ago, the ability to produce large quantities of well-characterized monoclonal antibody preparations revolutionized diagnostic and therapeutic medicine. Technical difficulties inherent in human hybridoma formation have led to novel molecular approaches that facilitate the isolation and production of human antibodies without the need for B-cell transformation, tissue culture, or even immunized individuals. These technologies, referred to as 'repertoire cloning' or 'Fab/phage display', involve the rapid cloning of immunoglobulin gene segments to create immune libraries from which antibodies with desired specificities can be selected. The use of such recombinant methods in transfusion medicine is anticipated to play an important role in the development and production of renewable supplies of low-cost reagents for diagnostic and therapeutic applications (Siegel, 2002).

Remarkable progress has been achieved in the development and improvement of new serological methods such that serology has become a dependable tool for many regulatory, research, and extension

purposes worldwide (Rocha-Pena and Lee, 1991). Through the use of monoclonal antibody technology, it is possible to design highly specific and sensitive serological assays (Nantulya, 1991). The ELISA and use of monoclonal antibodies are significant in the serological field whereas PCR and its direct and indirect uses for identifying (sequencing) and amplification of gene products, is vital to both research and applied fields (Crowther, 1998). Both areas have to be used in a complementary way in disease diagnosis.

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