

DETECTION OF BARLEY YELLOW DWARF VIRUS IN PAKISTAN

S. KHALID, M. AFTAB, I. AHMAD* AND M. ASLAM*

*Plant Virology Laboratory,
National Agricultural Research Centre, Park Road, Islamabad,*

Barley yellow dwarf virus (BYDV) is an important virus disease of small-grain cereals in the world (Henry & Dedryver, 1991). The infection of BYDV is characterized by several symptoms produced on barley, oat, wheat and other cereals, which include leaf discoloration and reddening, leaf necrosis, stunting, and delay and lack of heading (Kolb *et al.*, 1991).

In Pakistan BYDV was first noticed on the basis of symptoms in 1964, in wheat crop near Pak-Afghan border, but it was in 1987 when the presence of virus was confirmed by scientists at Rothamsted Experiment Station, England in leaves of diseased plants of wheat, barley, triticale (*X Triticosecale* Witmack), and oats collected from different localities (Aslam & Ahmad, 1987). Following 1987, Surveys in various years indicate that incidence of BYDV is increasing in cereals in Pakistan (Ahmad, *Personal communication*). The situation necessitated the need for a systematic study on the virus. The first step in this direction was to standardize the ELISA technique for detection and identification of the virus which is reported here.

Symptoms of BYDV infected plants were observed and recorded at three different planting sites at National Agricultural Research Centre (NARC), Islamabad. Samples for ELISA were collected

from patches on the basis of symptoms i.e., stunting, various degrees of yellowing/chlorosis, mosaic type in barley and dwarfing with leaf reddening in oats. Samples were prepared as described by Skaria *et al.*, (1985) and double antibody sandwich ELISA (DAS-LISA) was performed for detection of the virus (Clark & Adams, 1977).

A total of 60 samples (20 barley and 40 oats) were collected from different patches and tested through ELISA, of which 25 (9 barley and 16 oats) gave clear-cut positive ELISA values to BYDVPAV isolate. All the samples having red leaf symptoms or chlorosis with dwarfing gave positive ELISA values except in few barley plants with mosaic and chlorosis in which virus was not detected. In our study most of the samples in which PAV was detected gave very high ELISA values, which suggest that the concentration of virus (PAV) was high in these plants. On the other hand, weak reaction to MAV isolate indicate that the reaction was heterologous. This was also noticed by Griesbach, *et al.*, (1990) and they considered MAV-positive only if it was also negative for PAV. In case of low PAV and MAV-positive, the low MAV-positive value was taken as heterologous and sample was considered only as PAV-positive. So far, RMV, RPV, RPV and SGV isolates have not been tested for, but the results against PAV and MAV showed that PAV-like isolates are present in Pakistan. And no mixed infection was detected. On the other hand, samples giving negative ELISA values, especially those showing BYDV-like symptoms, suggest that they may be infected with other BYD isolates.

*Crop Diseases Research Institute, NARC, Islamabad.

The procedure adopted in the present study for detection of BYDV through ELISA serology gave satisfactory results. Further work on characterization of BYDV including identification of BYD isolates will continue through cooperation with other BYDV laboratories in the world. The antisera of the virus will be produced against the local strains of the BYDV isolates.

Acknowledgement

We are grateful to Dr. P. Gugerli, Station Federale de Recherches agronomiques de Changins, CH-1260 NYON, SUISE for his generous supply of IgG and IgG-conjugates to PAV and MAV isolates of Barley yellow dwarf virus.

References

- Aslam, M. and I. Ahmad. 1987. Barley Yellow Dwarf in Pakistan. In Proc. "World Perspectives on barley yellow dwarf" July 6- 11, Udine, Italy, p. 85.
- Clark, M.F. and A.N. Adams. 1977. Characteristics of the microplate method of enzyme-linked immunosorbent assay for the detection of plant viruses. *J. Gen. Virol.*, 34: 475-483.
- Griesbach, J.A., B.W., Falk and R.A. Valverde. 1990. Incidence of barley yellow dwarf viruses in California cereals. *Plant Disease*, 74: 111-114.
- Henery, M. and C.A. Dedryver. 1991. Occurrence of barley yellow dwarf virus in pastures of Western France *Plant Pathology*, 40: 93-99.
- Kolb, F.L., N.K. Cooper, A.D. Hewings, E.M. Bauske, and R.H. Teyker, 1991. Effects of barley yellow dwarf virus on root growth in spring oat *Plant Disease*, 75: 143-145.
- Skara, M., R.M. Lister, J.E. Foster and G. Shaner. 1985. Virus content as an index of symptomatic resistance in Barley yellow dwarf virus in cereals. *Phytopathology*, 75: 212-216.

(Received for Publication 4 September 1991)