VÍRUSBETEGSÉGEK BÚZÁBAN: DIAGNOSZTIKA ÉS VÉDELEM

VIRAL DISEASES ON WHEAT: DIAGNOSIS AND PROTECTION

Áy Zoltán
Gabonatermesztési Kutató KhT., Szeged
Cereal Research Non-profit Company, Szeged

The reliable monitoring of field virus infections of crop species is important for both farmers and plant breeders. Many cereal viruses were described in the second half of the 20th century. The most important challenge was to identify and detect different pathogens. Improved identification methods were developed which were more suitable for this task. At first, the detection of the viruses was done visually, based on disease symptoms. With the advent of electron microscopic methods and their diagnostic application viruses could be separated on the basis of their composition and architecture. The visual detection of viruses was further advanced by the new serological and molecular techniques. The most important cereal viruses were easily detectable by enzyme-linked immunosorbent assay (ELISA) using the viral coat protein as antigen. The most efficient and well-known virus diagnostic procedure was elaborated by the polymerase chain reaction (PCR) based on target amplification. The sensitivity of the PCR-based methods was higher than the above mentioned methods. PCR was applied successfully in the detection of cereal viruses using suitable primer pairs. An additional benefit of this method was the possibility of simultaneous diagnosis and detection of mixed virus infections.

Wheat is exposed to many pathogens because of its wide geographical spread. Although sixty-six viruses are able to infect grasses, only a few of them causes economically important yield depression on wheat. In Hungary, the four most dangerous cereal viruses are the *Wheat dwarf monogeminivirus* (WDV), the *Barley stripe mosaic hordeivirus* (BSMV), the *Wheat streak mosaic tritimovirus* (WSMV) and the *Barley yellow dwarf luteovirus* (BYDV). WDV is a single-stranded DNA virus while BSMV, BYDV and WSMV are single-stranded RNA viruses.

In this presentation, data on the above mentioned four important cereal viruses (WDV, BSMV, BYDV and WSMV) are published. The aim of our experiments was to detect virus infections of winter wheat in the extra mild 2006/2007 season. Twelve well-known winter wheat varieties were sown on two different dates (11th of October and 3rd of November 2006) and then, virus infections were studied at spring of 2007 using both by the traditional ELISA and by PCR-based methods.

The aphid-transmitted BYDV was found frequently whereas other viruses were found very rarely or were not detected. Forty-six per cent of the examined early-sown wheat plants proved to be infected by BYDV in ELISA, while using PCR, the virus was found in 58 % of the samples. Further, the results suggest that the optimal sowing time is critical in the control of cereal virus diseases, and additionally, that wheat varieties respond to the virus infections differently.