**Resistance to soil-borne wheat mosaic virus (SBWMV) in durum wheat.** H Lapierre [1], H Prud'homme [1], M Fouchard [1], D Hariri [1], F Limouzin [2] *([1] INRA, unité de pathologie végétale, F-78026 Versailles cedex; [2] Coopérative de la Franciade, F-41021 Blois, France)*

Two durum wheat cvs (Seti and Prodigal) have been tested for their resistance to SBWMV. In field conditions SBWMV was not detected in roots of these cvs during 2 successive growing cycles. In 1994 no mosaic symptoms were observed in these cvs. In 1995 mosaic symptoms were found in the cv Prodigal and rarely in the cv Seti. However, SBWMV was detected in low concentration and infrequently in cv Prodigal and was not detected at all in cv Seti.

Under laboratory conditions, we compared the susceptibility of cvs Prodigal and Seti with Ixos a susceptible cv and a bread wheat cv (Gascogne) resistant to transport of SBWMV from roots to shoots. SBWMV was not detected in the 2 resistant durum wheat cvs 17 d after seed germination at 15°C in infected soil. At the same date the roots of cvs Ixos and Gascogne showed a high viral concentration. However, after 27 d SBWMV was detected in the roots of cv Prodigal with moderate OD values compared with those of cv Ixos. In cvs Seti and Gascogne the OD values were extremely low or zero. When wheat seedlings were infected at 15°C for 1 week and then transferred to 20°C, SBWMV was detected earlier in the leaves of cvs Ixos and Prodigal and even in the leaves of cv Gascogne but not in cv Seti. Preliminary observations showed that *Polymyxa graminis* cystosori were present in lower concentrations in cvs Prodigal and Seti than in cv Ixos.

**Soil-borne wheat mosaic virus (SBWMV) on Triticale in Italy.** M Turina [1], C Rubies-Autonell [1], V Vallega [2] *([1] Istituto di Patologia Vegetale, Via Filippo Re 8, I-40126, Bologna; [2] Istituto Sperimentale per la Cerealicoltura, Via Cassia 176, I-00191 Rome, Italy)*

Soil-borne wheat mosaic virus (SBWMV) was first reported in Italy in 1960 on cultivars of common wheat *(Triticum aestivum)* grown in the Po Valley area (Canova and Quaglia, 1960). Subsequent surveys showed that SBWMV is widespread not only in northern Italy, but also in the central regions of the country and in certain areas of the south where the predominant crop is durum wheat *(T durum)*.

In the current season (1994–1995) SBWMV was also detected in plants of cv Trica, a newly released Triticale (x *Triticosecale*) on trial at the experimental farm at Ozzano, near Bologna. Seed of this cultivar was planted on October 18 (1994). On March 23, plants of cv Trica exhibited a slight chlorotic mottling, particularly in the distal portions of its younger leaves. Some of the plants showing chlorotic mottling were also stunted. Within each experimental plot (42 sq m), infected triticale plants were distributed in differently sized patches. Leaf symptoms remained clearly distinguishable until about April 10. Extracts from symptomatic leaves of cv Trica analyzed with immunosorbent electron microscopy (ISEM) revealed the presence of SBWMV particles.

To date, SBWMV on triticale has been identified in the USA, Germany and France. Moreover, reports from USA and Germany suggest that SBWMV causes less severe losses on Triticale than on wheat crops (Kucharek *et al,* 1988; Huth and Lesemann, 1994). On the other hand, SBWMV is widespread in Italy, and this signifies that assaying the reactions of commercial cultivars of Triticale to this virus is of importance, particularly in view of the fact that some of these cvs are officially recommended. Moreover, because Triticale and wheat are both susceptible to SBWMV, rotations entailing a close succession of these crops should be avoided in order to prevent more severe soil infestations.

Studies aimed at comparing SBWMV isolated from Triticale and common wheat cultivars are in progress.

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Kucharek TA, Griggs M, Cullen RE, Christie S (1988) *Proc Soil Sci Soc FLA* 47, 157-161

Huth W, Lesemann DE (1994) *4th Int Conf Plant Dis* Bordeaux 6-8 Dec

**Resistance of old French cultivars of bread wheat to soil-borne wheat mosaic virus (SBWMV) and wheat yellow mosaic virus (WYMV).** M Fouchard [1], D Hariri [1], H Prud'homme [1], I Lebrun [1], J Koenig [2], H Lapierre [1] *([1] INRA, unité de pathologie végétale, F-78026 Versailles cedex; [2] INRA, domaine de Crouëlle, amélioration des plantes, F-63039 Clermont-Ferrand cedex 2, France)*

Soil-borne wheat mosaic virus was reported for the first time in the 1920s (McKinney, 1923) in USA and with indication of its presence since the

19th Century (Canova, 1962). SBWMV and WYMV were observed in Europe only in the 1960s.

Studies on the susceptibility of old French cvs were undertaken for understanding the presence of these viruses before the 1960s and to search for new sources of resistance.

In the 1930s in the west of France about a dozen cvs were characterized based on their susceptibility to a soil-borne fungi *(Lagena radicicola)* (Ponchet J, unpublished results) but the symptoms recorded resembled those of soil-borne mosaic viruses. We have shown that these cvs have similar characteristics to cvs susceptible or resistant to SBWMV. Moreover, in the plots observed earlier to be infested by *L radicicola*, *Polymyxa graminis* and SBWMV were also present. Owing to the large-scale incidence recorded in the 1930s, it may be considered that SBWMV was probably present in that zone at least from the beginning of the century.

The characteristics of 158 sources of bread wheat growing in a plot having the SBWMV-WYMV complex were analysed. These sources consisted of landraces and the first wheat cvs registered in the French catalogue.

Two thirds of the sources showing mosaic symptoms contained SBWMV and WYMV. Like the modern wheat cvs grown in France, cvs showing a specific susceptibility to SBWMV (30%) were much more frequent than those showing specific susceptibility to WYMV (1%). The cv Noe, which was widely used for wheat breeding programmes at the beginning of the century, is included in the category of cvs uniquely susceptible to SBWMV.

Studies are in progress to define the mechanism of resistance against these 2 viruses, which represented one third of the sources tested.

McKinney H (1923) *J Agric Res* 23, 771

Canova A (1962) *Annali Acc Agric Bologna* 73, 291-299

**Genomic variability of bymoviruses.** HH Steinbiß *(Max-Planck Institut für Züchtungsforschung, Carl-von-Linné-Weg 10, D-50829 Cologne, Germany)*

Barley yellow mosaic (BaYMV), barley mild mosaic (BaMMV), oat mosaic (OMV), rice necrosis mosaic (RNMV), wheat spindle streak mosaic (WSSMV) and wheat yellow mosaic viruses (WYMV; possibly a strain of WSSMV) all have 2 positive-sense, single stranded, 3'-polyadenylated RNAs, separately encapsidated in 2 filamentous particles. These viruses were all recognized as members of a genus of the family *Potyviridae* named bymoviruses, and they are transmitted by *Polymyxa graminis* Ledingham, a soil-borne plasmodiophorous fungus with worldwide distribution.

Due to the mode of transmission, the cultivation of resistant cultivars is probably the only means of controlling bymoviruses. Genetically engineered resistance has failed to date. In 1988, symptoms of BaYMV were detected on resistant cultivars simultaneously in England and Germany. Restriction mapping of BaYMV-2 and sequence comparison with BaYMV-G revealed several minor variations, but no resistance-breaking mechanism has been identified. Interestingly, the similarity between BaYMV and BaYMV-2 seemed to be more pronounced for RNA1 than for RNA2. This likely indicates that RNA2 molecules of bymoviruses are particularly unstable and prone to deletions as shown for RNA2 of mechanically transmitted isolates of BaMMV and BaYMV. These deletions affect domains of the putative 73 and 70 kDa proteins, which are obviously not essential for replication but may the important for the transmission of BaMMV/BaYMV by *Polymyxa graminis*. Additionally, RNA viruses generally show high mutation frequencies because of a lack of the proofreading enzymes that assure fidelity of DNA replication. Therefore, population of RNA viruses do not consist of a single genome species of defined sequence, but rather of heterogeneous mixtures of related genomes (quasispecies).

**Molecular basis of the interactions between luteoviruses and aphids.** JFJM van den Heuvel *(DLO Research Institute for Plant Protection (IPO-DLO), PO Box 9060, NL-6700 GW Wageningen, The Netherlands)*

Luteovirus are single-stranded RNA viruses which infect a wide range of mono- and dicotyledonous plants in which they replicate almost exclusively in the phloem tissue. They are transmitted by aphids in a circulative manner. Briefly, this implies that virus particles are ingested along with phloem sap from infected host plants and transcellularly transported through the hindgut into the haemocoel. The virus particles acquired are retained in an infective form in the haemolymph for the aphids' lifespan, apparently without replication. Upon contacting the accessory salivary glands, they may be transported