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ORIGINAL PAPER

Cytogenetic analysis of the susceptibility of the wheat line Hobbit sib (Dwarf A) to *Septoria tritici* blotch

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Abstract *Septoria tritici* blotch, caused by *Mycosphaerella graminicola* (anamorph *Septoria tritici*), is one of the most important foliar diseases of wheat in much of the world. Susceptibility of host plants to septoria was investigated by cytogenetic analysis. A line of Hobbit sib (Dwarf A) in which translocated chromosome 5BS–7BS was nominally substituted by chromosome arms 5BS and 7BS from Bezostaya 1 had a much lower mean level of septoria than Hobbit sib itself. By the use of microsatellite markers, it was shown that the 5BS arm of this line had in fact been substituted by the homologous arm of Chinese Spring. Further investigation of substitution and nullitetrasomic lines demonstrated that chromosome arm 5BS of Hobbit sib possesses genes, which either promote susceptibility to septoria or suppress resistance. This chromosome arm has previously been shown to carry genes for resistance to yellow (stripe) rust and powdery mildew, implying a trade-off between resistances to these two diseases and to septoria in wheat breeding. Bezostaya 1 was found to have specific resistance to *M. graminicola* isolate IPO323, probably controlled by the gene *Stb6* on chromosome arm 3AS, present in numerous wheat cultivars. It also had partial resistance to septoria distributed over several chromosomes, which may explain the value of this cultivar as a source of septoria resistance.

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Introduction

Septoria tritici blotch (STB) of wheat, caused by *Mycosphaerella graminicola* (anamorph *Septoria tritici*), has a considerable economic impact on production in major wheat growing areas worldwide (Goodwin et al. 2003). In the UK, for example, it has been the most serious foliar disease of wheat since the early 1990s (Hardwick et al. 2003; Pillinger et al. 2004). Control of STB relies to a large extent on the use of fungicides, but the high cost of chemical control as well as the recent discovery of resistance to strobilurin (QoI) fungicides (Fraaije et al. 2005) has raised interest in other forms of control. As a result, there is considerable interest in breeding and growing cultivars resistant to STB as a cost-effective means of controlling the disease.

In recent years, several major genes for resistance to *M. graminicola* have been identified and mapped (Somasco et al. 1996; Arraiano et al. 2001b, 2007; Brading et al. 2002; McCartney et al. 2003; Adhikari et al. 2003, 2004a, b, c; Chartrain 2004; Chartrain et al. 2005a, b) as well as quantitative trait loci conferring partial resistance (Eriksen et al. 2003; Chartrain et al. 2004a; Simón et al. 2004). A gene-for-gene relationship has been demonstrated for *Stb6* on wheat chromosome 3A (Brading et al. 2002), which is widespread in sources of resistance to STB worldwide (Chartrain et al. 2005c).

The wheat lines studied in this paper are Bezostaya 1, Hobbit sib and Cappelle Desprez. The Russian winter wheat cultivar Bezostaya 1 (Lutescens 17/Skorospelka 2) is one of the most widely grown wheat varieties in the world (Worland et al. 1998). It has high levels of durable resistance