

Physical mapping of the 7D chromosome using a wheat/barley translocation line (5HS.7DL) produced in a Martonvásári wheat background by microsatellite markers

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Introduction

A wheat/barley translocation line was previously developed in Martonvásár from the **Mv9kr1 × Igri hybrid** (Molnár-Láng et al. 2000) and was identified as a **5HS.7D translocation** using fluorescence *in situ* hybridization (FISH) and 5H-specific barley SSR markers (Nagy et al 2002).

Wheat-barley translocation lines represents an important intermediate step in **transferring genes** of interest into wheat and they are excellent genetic materials for the **physical mapping** of genes or molecular markers to specific breakpoint intervals (bins).

Objectives

- To clarify which region of the 7D chromosome was substituted by barley chromosome arm 5HS.
- to allocate molecular markers to the short deleted chromosome segment using the translocation breakpoint as a new physical landmark.

Methods

- 7DS and 7DL-specific SSR markers
- GISH, FISH, 7DS-specific SSRs

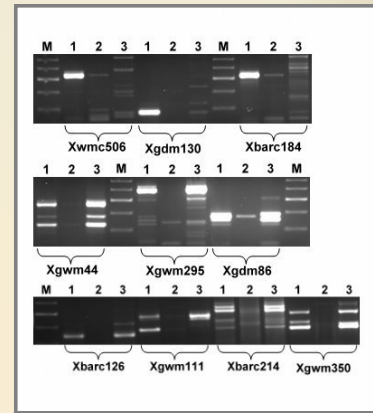


Figure 1: Agarose gel electrophoresis pattern of the 7DS-specific markers on wheat line Mv9kr1 (1), barley cultivar Igri (2) and on the Mv9kr1/Igri 5HS.7DS.7DL translocation line (3). The translocation line lacked fragments amplified by markers Xwmc506, Xgdm130 and Xbarc184.

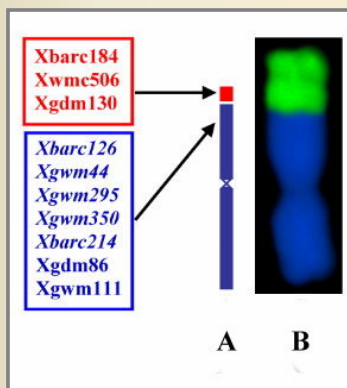


Figure 2A: Physical mapping of the tested 7DS-specific markers on the 5HS.7DS.7DL translocation chromosome. The positions of the markers are indicated by arrows. The markers previously mapped physically to the 7DS terminal region are in italics, while markers mapped physically in the present study to the deleted 7DS chromosome segment are visualised in red.

Figure 2B: GISH pattern of the 5HS.7DS.7DL translocation chromosome using barley DNA as probe. The barley chromosome segment is visualised in green and the 7D chromosome in blue.

Results

1. Identification of the deleted chromosome segment

✦The absence of the short terminal region of 7DS was revealed:

- by the absence of a strong Afa family signal (FISH) characteristic of the terminal 7DS (Nagy et al. 2002)
- and by three 7DS-specific markers (Xwmc506, Xgdm130 and Xbarc184) as they failed to amplify the 7DS-specific fragments on the Mv9kr1/Igri translocation line (Fig1, Fig2A)

✦Seven 7DS specific markers showed the presence of the proximal region of 7DS.

2. Physical mapping

✦None of the **three** markers localised to the short deleted segment were previously mapped physically within 7DS but genetic mapping studies located them close to the telomere of 7DS. ➔ The present study **physically mapped** them to the terminal 7DS (Fig2A,B).

✦**Four** of the markers located to the proximal (not deleted) 7DS (Xbarc126, Xgwm44, Xgwm295, Xbarc214) were mapped previously to the most terminal bin of 7DS, between fraction lengths (FL) 0.61-1.00 (Sourdille et al. 2004).

✦Obviously, the **three missing markers** (Xbarc184, Xwmc506, Xgdm130) were situated distally to the **four markers** mapped previously to the terminal bin of 7DS (Xbarc126, Xgwm44, Xgwm295, Xbarc214) (Fig2 A, B).

Conclusions

A new breakpoint interval within 7DS was detected by means of the fine mapping of 7DS, involving the *in situ* hybridisation of the 5HS.7DS.7DL translocation line, combined with microsatellite marker analysis.