



Molecular selection in one winter wheat population for *Fhb1* resistance gene to fusarium head blight

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Objective

Marker Assisted Selection (MAS) is an efficient strategy to increase breeding progress, especially for traits such as resistance to fusarium head blight (FHB) that are difficult to select for under field conditions and that are controlled by multiple genes. The purpose of the presented work is to incorporate resistance gene *Fhb1* located on chromosome 3B into one Polish advanced breeding line of winter wheat (recurrent parent, RP) SMH8527 (Smolice Plant Breeding Company, IHAR Group). The donor of the resistance gene is wheat line AIII62 (F_5BC_2) derived from the cross between Sumai 3 and Polish cultivar Muszelka. This line was confirmed with molecular markers to contain *Fhb1* gene (Fig.1).

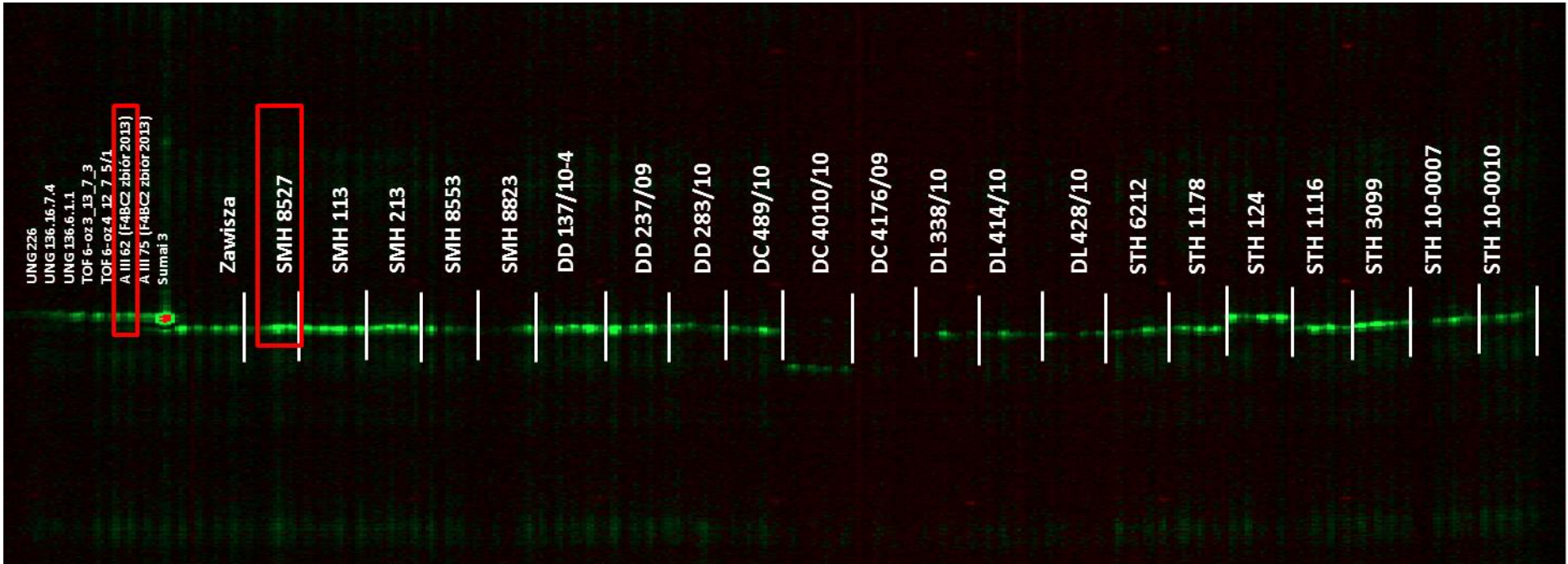


Figure 1. Amplification products of the UMN10 marker linked to the *Fhb1* gene. Highlighted are the lines used in this work

Materials and methods

In order to reduce the size of the donor chromosome segment containing the target locus, plant selection in the offspring population (F_1BC_2) is focused on selecting individuals with the target gene (*Fhb1*) and recombination events between the target locus and linked flanking markers (recombinant selection). DNA polymorphism between RP and *Fhb1* gene donor at ten SSR flanking markers (gwm389, barc238, barc12, gpw7080, gwm493, barc131, wmc754, gpw3248, barc92 and cfp1274) spanning ca 40cM (Fig.2), allowed us to choose two polymorphic flanking markers and central markers (confirming the presence of *Fhb1* gene).

Results

A total of 120 plants were tested with one central marker UMN10 and in the next step only heterozygous in UMN10 locus individuals were tested with flanking markers (cfp1274, gpw3248 and gwm389). Nine individuals were chosen after the analysis in order to obtain next generation (F_2BC_2) (Table).

Acknowledgements

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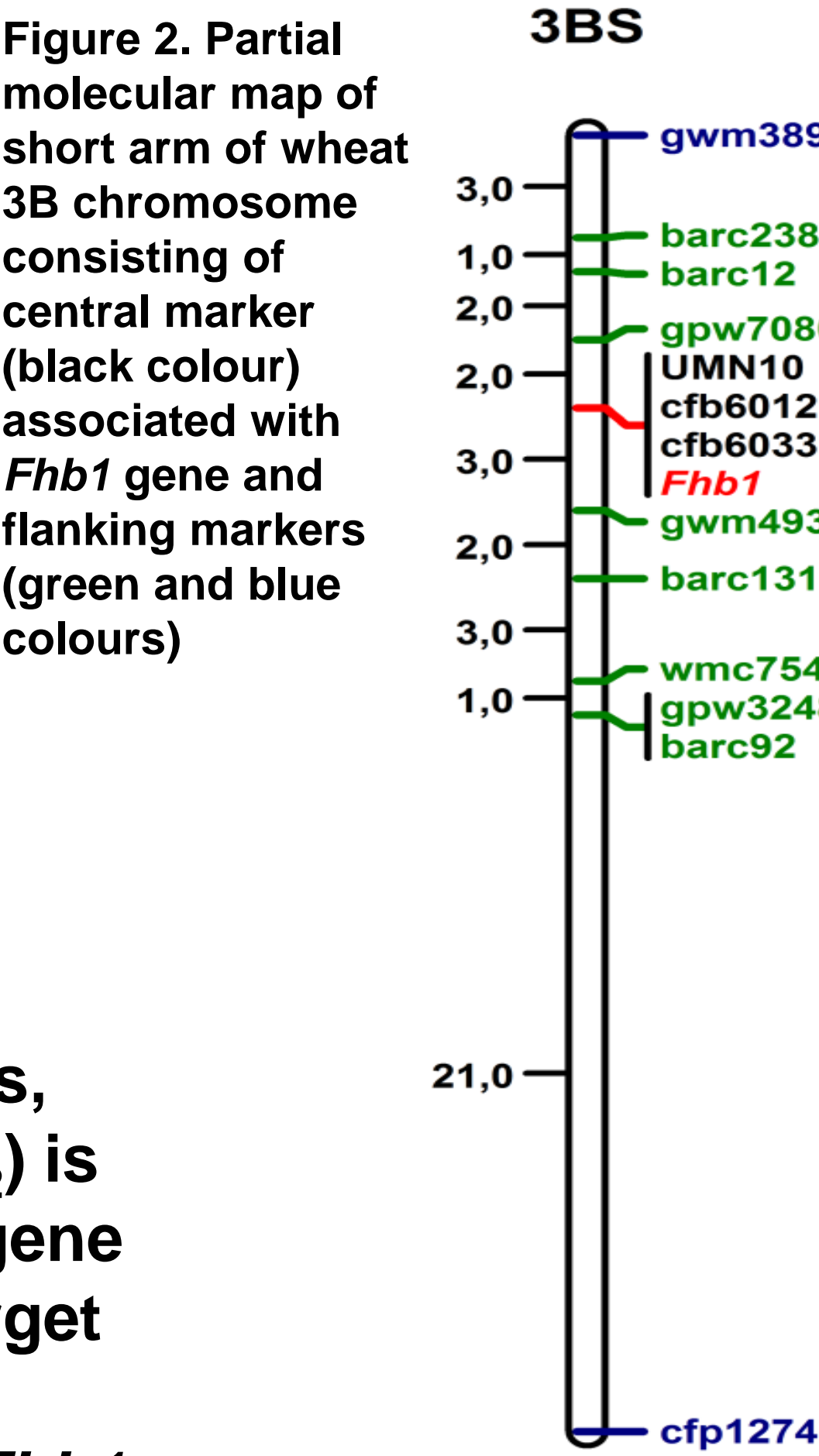


Figure 2. Partial molecular map of short arm of wheat 3B chromosome consisting of central marker (black colour) associated with *Fhb1* gene and flanking markers (green and blue colours)

Table. Molecular analysis of one winter wheat combination. Chosen individuals marked in blue.

Sample	UMN10	gwm389	cfp1274	gpw3248
SMH 8527	239	135	245	254
1	1	1	1	1
2	1	1	1	1
3	1	1	1	1
5	1	1	1	1
6	1	1	1	1
7	1	1	1	1
8	1	1	1	1
9	1	1	1	1
10	1	1	1	1
11	1	1	1	1
12	1	1	1	1
13	1	1	1	1
14	1	1	1	1
15	1	1	1	1
16	1	1	1	1
17	1	1	1	1
18	1	1	1	1
19	1	1	1	1
20	1	1	1	1
21	1	1	1	1
22	1	1	1	1
23	1	1	1	1
24	1	1	1	1
25	1	1	1	1
26	1	1	1	1
27	1	1	1	1
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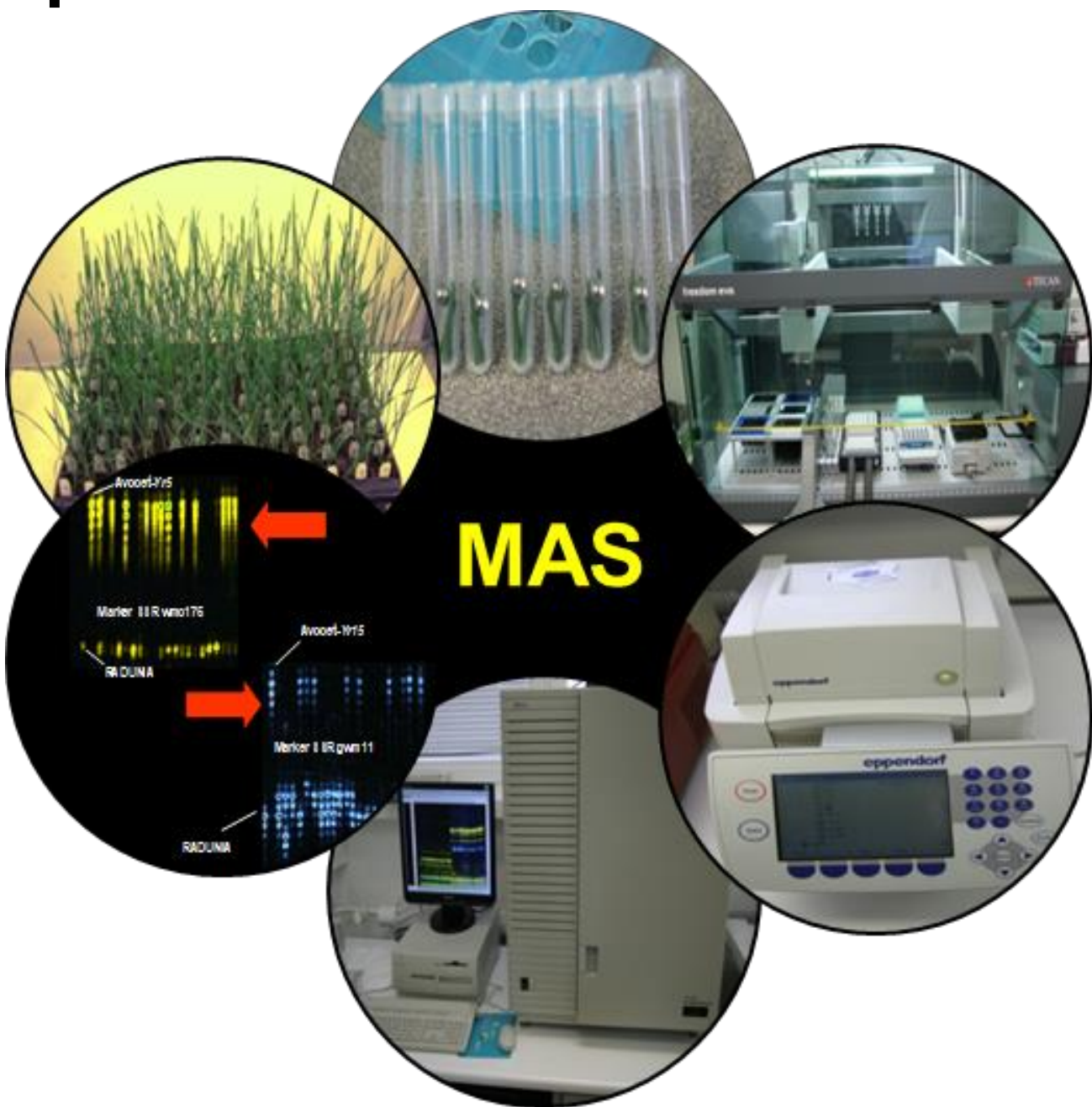


Figure 3. Diagram presents the workflow of DNA isolation, PCR and gel electrophoresis under Marker Assisted Selection.