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Screening of Crossing Block for Improvement of Wheat Quality

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[Introduction]

Gluten affected end-use quality of common wheat, also known as bread wheat, is consisted with glutenins and gliadins. Glutenin are divided by its protein weight into high molecular weight glutenin subunits (HMW-GS) and low molecular weight glutenin subunits (LMW-GS). HMW-GS represents approximately 10% of the total seed storage proteins and critically determines the strength and elasticity of dough with LMW-GS.

[Materials and Methods]

Nine wheat varieties covering diverse HMW-GS subunits were used to develop the numbering system for the HMW-GS subunits identification by Lab-on-a-chip. Three, four, and eight varieties were used to evaluate the protein amount of 8&10, 10&18, and 7^{OE} subunits on electropherogram. For crossing block, 121 varieties were obtained from the National Agrobiodiversity Center, NIAS, RDA.

[Results and Discussion]

The current study established a high-molecular-weight glutenin subunit (HMW-GS) identification system using Lab-on-a-chip for 3, 6, and 3 of allelic variations at *Glu-A1*, *Glu-B1*, and *Glu-D1* loci which are commonly used in wheat breeding program. The molecular weight of 1Ax1 and 1Ax2* encoded by *Glu-A1* locus were of 202 kDa and 192 kDa, and positioned below 1Dx subunits. The HMW-GS subunits encoded by *Glu-B1* locus were electrophoresed in the following order below 1Ax1 and 1Ax2*: 1Bx13 > 1Bx7 = 1Bx7^{OE} > 1Bx17 > 1By16 > 1By8 = 1By18 > 1By9. 1Dy10 and 1Dy12 having 11 kDa difference were clearly differentiated on Lab-on-a-chip. We have applied this Lab-on-a-chip technology for HMW-GS composition identification of 121 varieties to use for crossing block in wheat breeding program. And quality characteristics of 121 varieties were analyzed such as protein content. Finally we selected 50 varieties by investigating its HMW-GS composition and quality for wheat quality breeding.

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