Characterization of a set of antibodies and use of antibodies in wheat quality breeding programs.

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Wheat (*Triticum aestivum* L.), followed closely by maize and rice, is the most widely grown food grain for human consumption in the world. In addition to providing a range of nutrients, wheat also possesses unique properties which make it suitable for the production of different processed foodstuffs. The acreage of Korean wheat and the amount of consumptions of noodle and bread made of Korean wheat are increasing since 1991's campaign for the "우리 밀 살리기 운동". However, we shouldn't simply emphasize patriotism and free-chemical Korean wheats regarding to imported wheats which have to be treated with chemicals for shipment preservation. Therefore, it is necessary to draw our attention to developing wheats with good end-use qualities together with high yielding potential.

Wheat quality criteria are as variable as its uses. End-use quality of wheat primarily is a function of flour gluten proteins (glutenin & gliadin) which constitute over 80% of the total grain protein. Secalins are the major storage prolamins of rye (*Secale cereale* L.) and can be grouped by ω-, 40K γ-secalins, and HMW polymers. The major seed proteins in wheat, glutenin subunits and gliadins, are the products of genes located on the homoeologous chromosomes 1 and 6. Genes on the short arms of the group 1 chromosomes control ω-, γ-, β-gliadins and LMW glutenins, whereas genes on the group 6 chromosomes code for γ-,β-, and α-gliadins. The HMW glutenin shown to be controlled by long arms of group 1 chromosomes. In rye, the structural genes for HMW secalins are located on the 1RL, with those for ω- and 40K γ-secalins on the 1RS.

Homologous chromosome pairing in wheat and related species has been employed to transfer genes to wheats from several of its relatives, including rye. The selection for disease resistance among progenies produced from hybrids between rye and hard and soft wheats, has produced several wheat-rye chromosomal translocations (eg. 1AL/1RS,

1BL/1RS, 2RL/2BS etc.). Chromosome 1RS of rye carries valuable genes for disease resistance and insect resistance. The advantages of high grain yield and disease-resistance, therefore, led breeders to distribute translocation germplasm throughout the world. However, despite numerous agronomic advantages, pronounced defects in various end-use quality parameters have been associated with breeding lines carrying 1RS. In order to identify rye chromosomal parts in the form of wheat-rye translocations, development of efficient and sensitive methods of detecting translocations in flour samples is important.

Immunochemical studies are an alternative and/or complementary approach to conventional screening techniques. In particular, with the contribution of hybridoma technology, the advent of monoclonal antibody technology offers an opportunity to identify probes of greater specificity than other methods. This is particularly significant in view of the extensive homologies that exist between different gluten polypeptides, and among gliadins, glutenins and secalins. Early generation screening within breeding programs requires methods that can accommodate large number of samples in short periods of time. Enzyme-linked Immunosorbent Assays (ELISAs) have the capability to meet these requirements in assessing several quality related characteristics of wheats. The employment of ELISA using such Mabs offer the advantages of low running cost, simple sample handling and non-hazardous reagents, and can be applied to quality screening. This assay format can be both qualitative and quantitative.

We have developed a set of antibodies that can be used to identify and quantify the important groups of seed storage proteins known to affect wheat quality, and correlated the result of simple antigen-based quantifications with wheat quality characteristics. The presentation will describe the utilization of Mabs raised to semi-pure secalin from the rye meal and ω-gliadins from wheat flour in "high quality wheat breeding program". The details of contents are : i) characterize antibodies for their ability to identify and quantify specific proteins : ii) evaluate ELISA results with quality characteristics of wheats with diverse chromosomal compositions grown in numerous environments.