ALEXANDER RYBALKA, presentation resume (May 24, 2017)

The presentation encompassing genetic (pre-breeding) grain quality research of the following crops: winter wheat (baking and nutritional), winter triticale (distilling), winter (feed) and spring (food/feed) hull-less barley. The intervarietal as well as interspecific genetic variability of storage proteins, starch, and some important grain nutrients are in focus of the breeding related study. The presentation includes some pioneer research of storage proteins allelic diversity, *Gli*-alleles monosomic mediated chromosome location and telosomic gene mapping, protein sequences and their importance for wheat bread-making quality determination.

The use of interspecific crosses aimed on genetic manipulation with the key genome D of bread wheat allowed to transfer from wild Aegilops species to cultivated wheat some important characters related to wheat endosperm texture, biscuit and bread-making quality. On the base of the original interspecific variability first in Ukraine extra-soft red and white grain biscuit varieties were developed. The white wheat (bread and biscuit) pre-breeding program is also in progress accompanied with molecular genetic control of genes responsible for grain color and polyphenol oxydase activity.

Pre-breeding program including waxy genes (*Wx/wx*) manipulations resulted in development of the first in Ukraine waxy winter wheat variety.

The wide array of genotyped including wheat, triticale, sorghum, corn and hulled/hull-less barley were evaluated for the efficiency of starch-to-ethanol transformation. Winter triticale considered as the best starchy crop for distilling end-use in Ukraine. On the base of 5B(5D) chromosome substitution advanced breeding lines of winter triticale combined with high agronomic performance and efficient starch-to-ethanol transformation were developed.

The first in Ukraine pre-breeding healthy grain research projects is also in progress. The project aimed on development of the advanced breeding material of high protein (*Gpc-B1*) and high amylose wheat, high amylose hull-less low phytate barley, high vitamin and mineral black common and spelt wheat, winter wheat and hull-less barley with elevated free radical scavenging capacity. The largest in Ukraine pre-breeding hull-less barley program has resulted in development of the first high protein food end-use hull-less spring barley variety.

On the base of the healthy grain research program the “healthy bowel” breakfast author’s personal recipe composed with naked barley grouts, black wheat bran and flaxseed flour harmonized with fruit blend smoothie has been developed.

Several new efficient and time/chemicals-consuming laboratory protocols for mini-electrophoresis and two-step SDS-30 sedimentation procedure with semi-automatic microprocessor managed device were developed and applied into wheat breeding programs for all of the leading breeding centers in Ukraine. Some original wheat breeding material for bread and biscuit wheat, protocols for mini-electrophoresis are also applied for the Mais Angevin Nickerson wheat breeding program and seed purification at Chartainvilliers.

April 30, 2017

Alexander Rybalka