PROJECT: Spring wheat ionomics.

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PROJECT TITLE

Ionomics analysis and evaluation of environmental and genetic variation for essential and toxic elements in spring wheat in Northern Kazakhstan and Western Siberia.

CONSORTIUM

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SUMMARY OF THE REPORT

The project objective was evaluation of environmental, genetic and interactional effects on elemental composition in spring wheat produced in Northern Kazakhstan and Western Siberia. The content of macro-elements (Ca, K, Mg, P, S), micro-elements (B, Fe, Cu, Na, Mn, Zn), toxic trace elements (As, Cd, Co, Cr, Ni, Pb, Se) and trace elements (Li, Mo, Rb, Sr, Ti) in wheat grain was studied. The project focused on three key areas. **Project component 1:** Evaluation of natural variation of elements in wheat grain produced in Northern Kazakhstan and Western Siberia. **Project component 2:** Evaluation of genotype x environment interaction for elements composition in grain. KASIB (Kazakhstan-Siberia Network on Spring Wheat Improvement) Yield Trial for bread and durum wheat conducted in 2017 and 2018 served as a basis for this study. **Project component 3:** Evaluation of spring wheat genetic resources and gene discovery for elements concentration using genome-wide association mapping in Omsk, Russia.

The project was highly successful with the following main results: 1) Proved that spring wheat grain grown in Northern Kazakhstan and Western Siberia is free from toxic elements. 2) Genotype x environment interaction for elemental composition was proven for both bread and durum wheat and genotypes with high concentration of macro- and micro-elements were identified; 3) Spring wheat genetic resources were evaluated and primary synthetics were identified possessing high concentration of several elements. 4) Genes controlling concentration of macro- and micro-elements were identified. 5) Bilateral visits of Ionomics platform Coordinator Dr. Paulina Flis to Kazakhstan and Kazakh scientist Dr. Timur Savin to Nottingham University was very useful in establishing cooperation and contributed to project success. 6) At least three papers will be prepared for publication based on the project outcome. The project staff expresses sincere thanks to EPPN and Ionomics Platform staff for conducting this study.