International collaboration to improve wheat quality for processing and health

Tatsuya M. Ikeda, Carlos Guzman, Angela Juhasz, John Rogers, Peter Shewry, Valerie Lullien-Pellerin, Sofia Chulze, Ravindra Chibbar, Gerard Branlard, Roberto J. Peña

Topic: Genetics and Genomics of Resource Efficiency; Quality and Composition

International collaboration to improve wheat quality for processing and health

Tatsuya M. Ikeda[1], Carlos Guzman[2], Angela Juhasz[3], John Rogers[4], Peter Shewry[5], Valerie Lullien-Pellerin[6], Sofia Chulze[7], Ravindra Chibbar[8], Gerard Branlard[9], Roberto J. Pena[2]

[1] NARO, Western Region Agricultural Research Center, Nishifukatsu, Fukuyama, 721-8514, Japan; [2] CIMMYT, K. 45 Carretera Mexico-Veracruz El Batan, Texcoco CP 56130, Mexico; [3] Murdoch University, Murdoch, WA 6150, Australia; [4] Universidad Nacional del Centro de la Provincia de Buenos Aires, Av. República Italia 780, C.C. 47, 7300 Azul, Provincia de Buenos Aires, Argentina; [5] Rothamsted Research, West Common, Harpenden, Hertfordshire, AL5 2JQ, UK; [6] INRA, UMR Ingénierie des Agropolymères et Technologies Emergentes, Bat 31, 2 Place P. Viala, 34060 Montpellier Cedex 1, France; [7] Universidad Nacional de Rio Cuarto, Rio Cuarto-Córdoba, Argentina; [8] University of Saskatchewan, 51 Campus Drive, S7N 5A8 Saskatoon, Canada; [9] INRA, UMR GDEC, 5 Chemin de Beaulieu, 63039 Clermont Ferrand Cedex 2, France

Tatsuya M. Ikeda tmikeda@affrc.go.jp

Key message: The Expert Working Group on 'Improving Wheat Quality for Processing and Health' of the Wheat Initiative aims to maintain/improve the quality of high-yielding wheat under varying environmental conditions.

The Expert Working Group (EWG) on Improving Wheat Quality for Processing and Health of the Wheat Initiative, established in 2015, aimed to maintain/improve the quality of high-yielding wheat under varying environmental conditions. This EWG focuses on wheat quality in the broad sense, including grain compositional factors (proteins, allergens, carbohydrates), nutritional quality, grain processing, food safety, genetic resources and gene nomenclature as shown in Figure1. The EWG also promotes the sharing of genetic resources and the standardisation of nomenclature of genes related to grain quality. The first meeting of the EWG was hold in Paris in 2016, with 31 researchers from 18 countries. We are working on the following globally important topics: (i) standardising methods to determine gluten protein composition, while unifying the nomenclature to define allelic diversity of gluten proteins, and improve the understanding of the role of gluten proteins on dough processing and end-product properties; (ii) germplasm screening for the identification of sources of variation for various quality component traits; (iii) a deep understanding of the inheritance and genetic factors controlling te bioavailability of grain bioactive compounds, including micronutrients and dietary fibre, to improve the nutritional and health value of wheat and cereal-based foods; (iv) a deep understanding of the nature and content of proteins and other factors, such as fermentable oligosaccharides, disaccharides, monosaccharides and polyols (FODMAPs) of wheat showing negative effects on health and toxic reactions and developing low-allergen and low FODMAP wheat suitable for patients suffering various wheat related food disorders; (v) understanding the effects of food manufacturing processes on the digestibility of wheat proteins, bio-availability of nutrients, and the interaction with gut micro-organisms; (vi) fine-tuning gluten, starch properties and grain hardness according to specific (and diverse) end-uses by understanding genotype × environment × management interactions; (vii) reducing mycotoxins and toxic minerals in wheat and wheat products; (viii) development of low cost biomarkers for the above determinants of wheat quality and safety.