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ANTINUTRITIONAL FACTORS IN PEARL MILLET GRAINS: PHYTATE AND GOITROGENS CONTENT VARIABILITY AND MOLECULAR CHARACTERIZATION OF GENES INVOLVED IN THEIR PATHWAYS

OROZCO-ARROYO G.*, BONCOMPAGNI E.**, COMINELLI E.*, GANGASHETTY P.I.***, GRANDO S.****, KWAKU ZU T.T.**, DAMINATI M.G.*, NIELSEN E.**, SPARVOLI F.*

*) Institute of Agricultural Biology and Biotechnology – CNR, Milan (Italy)
**) Department of Biology and Biotechnology, University of Pavia, Pavia (Italy)
***) ICRISAT Sahelian Center, International Crops Research Institute for the Semi-Arid Tropics, Niamey (Niger)
****) ICRISAT Patancheru, International Crops Research Institute for the Semi-Arid Tropics, Andhra Pradesh (India)

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Pearl millet [Pennisetum glaucum (L.) R. Br.] is an important "orphan" cereal and the most widely grown of all the millet species worldwide. It is also the sixth most important cereal in the world after wheat, rice, maize, barley, and sorghum, being largely grown and used in West Africa as well as in India and Pakistan. The present study was carried out in the frame of a program designed to increase benefits and reduce potential health problems deriving from the consumption of pearl millet. The specific goal was to provide a database of information on the variability existing in pearl millet germplasm as to the amounts of phytate, the most relevant antinutrient compound, and the goitrogenic compounds C-glycosylflavones (C-GFs) accumulated in the grain.

Our results clearly show that, as indicated by the range in values, a substantial variability subsists across the investigated pearl millet inbred lines as regards the grain level of phytic acid phosphate, while the amount of C-GFs shows a very high variation. Suitable potential parents to be used in breeding programs can be therefore chosen from the surveyed material in order to create new germplasm with increased nutritional quality and food safety. Moreover, we report novel molecular data showing which genes are more relevant for phytic acid biosynthesis in the seeds as well as a preliminary analysis of a pearl millet orthologous gene for C-GFs biosynthesis. These results open the way to dissect the genetic determinants controlling key seed nutritional phenotypes and to the characterization of their impact on grain nutritional value in pearl millet.