58th ANNUAL CONGRESS
SOCIETA' ITALIANA DI GENETICA AGRARIA
Alghero - 15 / 18 September 2014

ABSTRACT

TITLE →
(TNR, 12 cpi, bold, uppercase, no justify)

AUTHOR/S →
(TNR,10 cpi, uppercase)

INSTITUTION/S →
(TNR, 10 cpi, normal,)

KEYWORDS →
(TNR, 10 cpi, italic, max 5)

TEXT →
(TNR, 10 cpi, justify)

TNR: Times New Roman

SEED QUALITY IMPROVEMENT OF PEARL MILLET, AN ORPHAN CROP, STAPLE FOOD FOR POOR FARMING COMMUNITIES

COMINELLI E.*, BOLLINI R. *, DAMINATI M. G. *, NIELSEN E. **, LAPLAZE, L.***, SPARVOLI F.*

*) Institute of Agricultural Biology and Biotechnology, CNR, Milan
**) Department of Biology and Biotechnology, University of Pavia, Pavia
***) IRD, UMR DIADE, Montpellier, France

Pearl millet, biofortification, phytic acid, storage proteins

Pearl millet is the sixth most important cereal grain. Pearl millet is mostly grown in areas with limited agronomic potential characterised by low rainfall (300-500 mm) and marginal soils. This characteristic makes millet an important food staple all over the African continent, especially in the semi-arid areas of the Western Sahel where other crops tend to fail because inadequate rainfall and poor soil conditions. Despite its importance, pearl millet is considered an orphan crop because it has received very little support from science, industry and politics.
Pearl millet is a significant source of micronutrients such as iron and zinc (contents are higher than those in other cereals) both in India and sub-Saharan Africa where it potentially represents one of the cheapest source of these micronutrients and proteins as compared with other cereals and vegetables. However there is need to increase pearl millet nutritional potential and diversify its uses to make it more attractive and fully use its potential in dry regions.
The aim of the NewPearl project, recently funded by Cariplo and Agropolis Foundations, involving different scientists from France, Italy, India, Niger and Senegal, is to provide tools and knowledge to accelerate the breeding of new pearl millet varieties with increased nutritional qualities, as well as better adaptation to environmental stresses. The genetic diversity of a set of 100 inbred lines (ILs) will be explored in order to identify the cellular and molecular bases of pearl millet i) root development and interaction with the rhizosphere microbiota, and ii) seed quality traits. The role of our group in the project will focus on the characterization of seed quality traits, mainly related to the content and quality of seed storage proteins, and the content of phytic acid, a well-known antinutritional compound.
Pearl millet major storage proteins are prolamins, similar to those present in maize, but detailed information on this species is limited. This information would be important not only from a nutritional point of view but also from a technological point of view for example in the production of biodegradable films. A detailed analysis of storage protein composition in the set of ILs will be performed.
Concerning iron biofortification advanced breeding lines and germplasm with high iron content have been identified in pearl millet. However, the efforts to develop crops with increased minerals must address the issue of the drastic decrease in cations bioavailability caused by the presence in the seeds of phytic acid ($InsP_6$). Phytic acid and its less abundant derivatives $InsP_5$ and $InsP_4$ are well recognized anti-nutrients, as, during gastro-intestinal passage, they bind trace elements (e.g. Fe, Zn, Ca and Mg) and reduce their absorption leading, under certain dietary circumstances, to mineral (mostly Fe, Zn, Ca) deficiencies. The collection of ILs will be characterised for the phytate and essential minerals content. During the project relevant genes involved in phytic acid synthesis will be identified and their expression will be investigated at different seed developmental stages. Moreover a pearl millet TILLING population will be screened to search for low phytic acid (*lpa*) mutants, a successful approach to reduce the antinutrient effects of $InsP_6$, as shown in other crops.

SESSION NUMBER
(only one, as listed in the Congress programme, otherwise put X)

3

PRESENTATION FORMAT

Oral	
Poster	**x**

SIGA CONGRESS AWARDS
Request to participate (check the box)

❑

CORRESPONDING AUTHOR: SURNAME COMINELLI NAME ELEONORA
Institution Institute of Agricultural Biology and Biotechnology
Phone +390223699421 Cell phone +393289412912 E-mail cominelli@ibba.cnr.it

Send by e-mail (rtf format) to: convegno@geneticagraria.it

Deadline: June 15th, 2014