

RESOURCE USE (ADAPTATION AND MITIGATION)

Genetic Resources/Climate Change Adaptations

KEYNOTE SPEAKER

Benvindo Maçãs, is a plant breeder Director of Research Unit of Biotechnology and Genetic Resources, INIAV, Portugal. Wheat, Triticale and Barley Breeder during 25 years at the National Plant Breeding Station, Elvas, Portugal. Started as CIMMYT trainee in 1985 in the Wheat Program, where took contacts with Dr. Norman Borlaug, Nobel Peace Prize, 1970. From 2008 is leading the National Breeding Programs of INIAV and the National Plan of Plant Genetic Resources.

Was responsible for teaching of Plant Breeding at the University of Évora, during 6 years.



CHALLENGES

Expected Impacts of Climate Change on Crop Production/Adaptation (Mediterranean Region):

- Agricultural production may decline along Mediterranean and in South-Eastern Europe;
- Change land use, with cropping becoming non-viable;
- Changes on pastures crops growth cycle with impact on animal production sustainability;
- Production of temperate fruits and nuts will drop because of reduced winter chill;
- Geographical spread of pests and diseases for plants and animals θ Yields and/or quality of crops like wine grapes are likely to decrease;
- Increasing surface affected by desertification and salinization.

PRESENTATION

Plant and Animal Genetic Resources are key components of sustainability resilience and adaptability in agricultural production systems.

Climate change poses new challenges regarding plant and animal adaptation underlying the importance of genetic resources. Projected impacts of Climate Change on the world agriculture pointed out that agricultural production may decline in many

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regions namely on the Mediterranean Countries. Climate change is predicted to negatively affect the production and crop distribution because of drought, heat and reduced winter chill. These changes will also create problems for the livestock sector. Pastures growth cycle will be impacted by heat and of water supplies for animals will become more unpredictable.

For thousands of years, farmers have adapted new crop species and varieties and their cropping systems as environmental conditions have changed.

The speed and complexity of the actual climate change are likely to present unprecedented challenges. New crop varieties will be needed, and in some cases farmers will have to shift to grow even new crop species.

Plant and animal genetic resources will be vital in adapting crop production to the effects of climate change and this needs a multi-actor approach promoting networks that can explore all the modern science technologies of breeding based on ideotype design, gene mining, phenotyping a vast range of genetic resources to improve programs of germplasm in development.

The use of high-throughput approaches to genotyping and phenotyping to support diversity based initiatives for crops and animals is highly dependent of the use of digitization that offers an unlimited storage capacity for complex and varied data. In this context the modern technologies help optimize the predictability and the efficiency of plant breeding but the relationship between plant genotypes and the environment will continue to drive genetic improvements for future generation.



As Climate Changes proceeds a broader range of species will need to be exchanged among Countries and regions. It is important to ensure that genetic resources can be accessed by those who need them. The International Treaty on Plant Genetic Resources for Food and Agriculture provides a multilateral legal framework that facilitates exchange of plant genetic resources.

MAIN OUTCOMES FROM THE DISCUSSIONS

- The need to follow holistic approaches to develop varieties of important crops adapted to climate change in the Mediterranean region and also to consumer needs
- Use of high-throughput approaches to genotyping and phenotyping to support diversity-based initiatives for crops and animals
- Valorisation of local genetic resources (source of specific traits, better adaptability to local environmental conditions)
- Networking - Big data; summarize different fields

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- Opportunity for phenotyping including farmer's knowledge with a participatory approach

INNOVATION PROJECTS

At this thematic session, each participant assisted to the presentation of 3 of the following posters:

- **Broadening and improving biodiversity** for a more competitive and sustainable viticulture in the Colli Piacentini area
- **ConVIGNA** - Maize and cowpea intercrop
- Genetic intra-varietal evaluation and conservation and Selection of Ancient Grapevine Varieties
- **LIVESEEDS**
- **LUSARROZ** - Breeding new portuguese rice varieties
- **SoIACE**- Solutions for improving Agroecosystem and Crop Efficiency for water and nutrient use (new genotypes to face multiple stresses)
- **STRAWBERRY TREE** - Conversion of a wild plant into a profitable fruit tree species (*Arbutus unedo*)
- To select the animals genetically more suitable for the production of quality milk, by determining the profile of caseins, isolated from milk
- **TOMGEM** - A multi-actor approach for new tomato varieties with improved yield and quality to face climate change
- **TREASURE** - Diversity of local pig breeds and production systems for high quality tradit. products and sustain. pork chains

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