

Ad hoc support : SORGNET

Establishing a European - West African Sorghum research network to foster sorghum value chain innovations

ABSTRACT

a-Sorghum, a species originating from semi-arid agro-ecologies with a tremendous potential at the European level

Sorghum is the fifth most important cereal crop in the world based on total grain production (<http://faostat.fao.org/>). It is an essential component of the cropping systems of subsistence farmers and diets for more than half a billion people in the semiarid tropics. In developed countries, it has been primarily grown for animal feed but new uses are emerging regarding human nutrition. In addition, its merits as a sugar producing crop have been recently highlighted, allowing new uses for either human nutrition or other bio-based uses (energy, building blocks...). Its success is mainly due to i) its high 3 level of drought tolerance, ii) its high nutrients use efficiencies, and iii) its adaptation to a large array of environmental conditions, cropping systems and uses. The release in 2009 of its genome sequence, its phylogenetic proximity with several important C4 species (maize, sugarcane...) and its low genome complexity, also contribute to its interest on a more fundamental level. At the European level, in the current context of global warming and of requirements of crop production systems with lower environmental footprints (water and nutrients management, greenhouse gas emissions...), the relevance of sorghum to support the animal nutrition market is increasingly recognized. At the same time, new markets are also emerging, like in the US, at the human nutrition level partly due to its low glycemic index. Combined with the suitability of sorghum to support the biomass value chains (energy and biobased applications), these evolutions highlight the key importance of sorghum in the diversification of the crop portfolio that will allow the European agriculture to face the XXIst century challenges.

The growing interest of sorghum at the EU level (and more generally in temperate countries) is anchored on the functional diversity that has been generated by semi-arid farmers since sorghum domestication several thousand years ago. Through their patient selection efforts of different sorghum ideotypes suitable for different end-uses and agro ecologies they provided the genetic basements for the development of cultivars suitable for the temperate agrosystems. In addition, local processors developed a wide array of human nutrition products whose processing strategies can be remobilized to support the emergence of new sorghum derived products in temperate regions. Lastly, based on 6000 to 8000 years of low inputs production systems expertise, farmers of the semi-arid regions constitute a formidable source of inspiration towards the development of more resilient but also more efficient production systems (interspecific and intraspecific associations, adaptation to harsh contexts with a high inter-year variability...).

b- Sorghum research is lacking a European-West African community dynamic
Since 2016 and the first pluridisciplinary European Sorghum Conference held in Bucharest (Romania, <https://www.sorghum-id.com/conclusions-congres-2016/>), the European sorghum community benefited of the emergence of SorghumID (<https://www.sorghum-id.com>), the European sorghum interprofessional association. Following this founding event, a second conference was organized in 2018 in Milan (Italy) and a third one is being prepared for 2021. This third conference will be hosted in Toulouse (Occitanie, France). These events constitute key opportunities for the stakeholders of the sorghum value chains to meet and exchange their point of views, problems and solutions. Nevertheless, according to the specific targets of SorghumID whose role is to promote sorghum cultivation and processing across Europe these events are principally directed towards professionals (producers, seed and agri-food industries and market consultants) and only attract a few researchers.

The Agropolis members, led by the AGAP unit, have also been instrumental to support interactions between the value chains (private sector) and the research community at the Occitanie level through the organization, in May 2019, of a devoted one-day workshop entitled "Multi-purpose sorghum, promising

market opportunities” in partnership with Sorghum ID (<https://www.sorghum-id.com/>) and the Laboratory of Agro-Industrial Chemistry (INRAE- INP ENSIA- CET). This event also received the support of the regional Agency for Innovation (Ad’Occ, <https://www.agence-adocc.com/>) and the innovation cluster: AgriSud Ouest Innovation (<https://www.agrisudouest.com/>). This event gathered 67 participants that participated to three thematic workshops entitled « Crop production », « Prospective value chains » and « Sorghum for food ». All the participants recognized the interest of such event, but also highlighted the limits of the regional context to maximize efficiency (other research skills are available outside Occitanie and value chain stakeholders share the same needs at a more global level) and the needs for deeper interactions among the research actors. In this current context, the European sorghum research community is lacking opportunities to meet and exchange. Such situation leads to a lack of coordination to succeed in capturing EU based fundings that translates in a limited efficiency to support innovations for the different sorghum value chains. Beyond the need to better link-up European sorghum research initiatives and groups, the pedoclimatic conditions for sorghum cultivation in EU combined with its specific market demands (GMO free, lower environmental impacts, high societal values) also require a specific look into compared to the efforts developed in the US and in Australia (the two most active countries of temperate area at the sorghum research level).

In addition, there are clear benefits to take advantage of the synergies between temperate and semi-arid research activities to foster innovation in both agro-climatic ecologies. The Agropolis members already proved their capacities to collaborate closely with West African research groups in several collaborative projects (Agropolis DURAS (2004-2008, <https://www.Agropolis.fr/gestion-projets/duras-promotion-developpement-durable-sud.php>), ANR Grassbiofuel (2008- 2011), GCP MARS (2008-2014), GCP BCNAM (2010-2014) and Agropolis Cariplo BIOSORG (2014-2017) among several others). CIRAD, and particularly the AGAP unit, is part of IAVAO (Innovation and Plant Breeding in West Africa), a platform for research and training in partnership, together with four national research institutes in Africa, (ISRA in Senegal, INERA in Burkina Faso, IER in Mali and INRAN in Niger), the university of Thies in Senegal, IRD and Montpellier SupAgro in France, and CORAF as a regional organization in West and Central Africa. IAVAO aims at integrating a multidisciplinary approach in the design and the implementation of breeding programs addressing the complexity of agroecological systems of Sub Saharan Africa. Nevertheless, these projects and networks, only rarely, aimed to sustain innovations simultaneously in both regions. The Agropolis perimeter encompass several key actors of the European sorghum research, in addition it benefits of privileged links with the European community that have been built over the years. As a consequence, the Agropolis community has the legitimacy to stimulate more efficient EU based interactions but also to engage West African partners in this dynamic to the sake of a more effective EU-West African sorghum research network.

In this context, this proposal aims to take advantage of the 3rd SorghumID conference that will be organized the 12th and 13th of October 2021 in Toulouse to organize a European Sorghum Satellite Research Conference “ES²RC”.

Keywords : Sorghum, Research Network, North-South synergies, Pluridisciplinarity, Public-Private collaborations, European, West African

Year : 2021

Project number : 2100-013

Type of funding : SP

Project type : PC

Research units in the network : AIDA DIADE IATE LBE LEPSE TETIS SELMET LSTM BPMP

Start date : 2021-03-01

End date : 2021-12-31

Flagship project : no

Project leader : David Pot

Project leader's institution : CIRAD

Project leader's RU : AGAP

Budget allocated : 6000 €

Total budget allocated (including co-financing) : 6000 €

Funding : labex

GOAL

At the European / International levels the ES²RC will :

initiate the federation of a European – West African research group (SorgNet) with an increased visibility for the European and international funding agencies,

- Highlight the benefits of European-West African partnerships to tackle the common challenges these regions have and will have to face, and recognize the relevance of the activities developed in West Africa,
- Contribute to intensify the links between West African researchers and Europeans ones in order to engage the last ones in the challenges West Africa has currently, and will have, to face,
- Increase the visibility of the Agropolis sorghum research community as a key player of European and international sorghum research.

At the Agropolis level, this conference will allow to reinforce the links between the different research groups and scientists. These links already exist but they can clearly be strengthened. The beneficial effects will not only arise from the conference by itself but also through the preparation process that will require strong interactions between the different Agropolis groups.

This satellite conference will also provide a clear framework to review the results of the European sorghum groups since 2004, when Berenji and Dalhberg published their article entitled “Perspectives of sorghum in Europe”. This satellite conference in synergy with the SorghumID global conference will also allow to build up a prospective analysis of the key challenges that Europe and West Africa will have to face in the next decades. This “challenges list” will be accompanied by a critical analysis of the current possibilities of the European – West African Sorghum research community to tackle these (availability / deficiencies in terms of skills, tools...).