



Millet value chain improvement through innovative technologies and marketing strategies

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Introduction

- Institut de Technologie Alimentaire (Institute of Food Technology, ITA) is a scientific and technological Public Establishment founded in 1963 by the Senegalese Government.
- Its mission is to improve the performance of the agro-industrial sector in Senegal and in the sub-Saharan region through research/development and technology transfer.
- ITA interventions focus on the whole value chain processing and conservation of agricultural, horticultural, forestry, fishery and livestock production.

Introduction

- ITA has done lot of researches and technology development on local cereal grains include millet, sorghum, rice, fonio, corn etc.
- Regarding the pearl millet value chain ITA has worked collaboratively with **ISRA** on improving the production of many millet varieties through projects including INSORMIL, West Africa Agricultural Productivity Program (WAAPP, the latest), etc. And their diffusion with **ANCAR**.

While on processing many achievements were realized by ITA in many areas regarding as examples we can mention:

- **Reduction of the cooking time** of the Senegalese “arraw” (rolled millet flour) and **incorporation of millet flour** in breadmaking (INSORMIL, WAAPP), etc.
- Improvement of key micronutrients (iron, zinc, phosphorus, etc.) **using parboiling** of Senegalese rice varieties and being applied to millet (WAAPP, SIIL)
- Nutritionally improving instant millet flours (iron, vitamin A, and zinc) with local plant materials using **extrusion technology** (Food Processing Innovation Lab). The process of **economic couscous** (WAAPP) to overcome the constraints of rolling the flour which is a high human resource consumption.

Introduction

- ITA has transferred and trained all cereal processors in Senegal mostly represented by woman economic groups of interest (GIE).
- The general approach has been implemented on detecting needs from processors and adequate funds were gotten from:
 - Projects through research programs (mostly)
 - Government institutions with their collaborators
 - Self support enterprises (mostly through trainings)
- Once solutions on needs have been found and experimented, ITA organizes a restitution of the results through different formats:
 - By transferring the technology directly to the beneficiaries through trainings and follow up,
 - By incubating entrepreneurs and by providing technical expertise and related equipment for a limited time (6 to 12 months).
- ITA partners are national and in the region research institutions (ISRA, ANCAR, IER, IRSAT, INRAN, etc.), international ones (Kansas, Purdue, Pretoria universities, Gembloux Bio-industry etc.), university of United Nations, CIRAD, ICRISAT, CORAF, and many collaborators in the private sector (in Senegal: GIE-TDS, Free Work Service, Vivriere, Maria production, etc. and overseas: STA in Niger, One high standing enterprise in Guadeloupe, KERIDAM in Swaziland, etc.)

Current activities

- Improving linkages among the various segments of the millet value chain:
 - Working with ISRA for nutritionally enhanced millet grains with high production.
 - Organizing producers with ANCAR for clean and safe grains for the processors
 - Working with Purdue on aflatoxin safe millet grains for market of ECOSWAS.
- Enhancing millet grain products with oleaginous grains include cowpea, peanut, mungo bean (will be later explored), locally produced mushroom, etc. In this aspect, enhancing flatulence aspect on cowpea with amylase produced bacteria has been initiated with Gembloux (Belgium). An important strain (producing α and β amylases) was isolated from cassava. The same strain could be applied into the other beans.
- Incorporation of cereal grain flours including millet into bread making (at least 30% of incorporation).
- Producing high quality millet flour for different purpose, instant arraw /and or couscous, instant millet flours for children, etc.
- Bioavailability of iron in rice using parboiling (Pretoria). Being experimented in millet.

Key Achievements/Outputs (if applicable)

- Improvement of commercial infant millet based products for urban enterprises
- Technology transfer on disseminating the parboiling technology on producing high quality rice.
- Technology transfer on extrusion process to the GIE Touba Darou Salam that has started producing high quality instant millet flour ordered by CLM (National Committee for Control of Malnutrition)
- Collaborative works with CLUSA have been initiated on training entrepreneurs in rural areas on millet processing and packaging technologies. Further dissemination will be done on the extrusion process.
- Technology transfer **on economic couscous** is being done with Free Work Service and to other enterprises.
- Incorporation of millet, sorghum, and corn flours in bread making (at least 30% with the sorghum without tannins)

Future goals

As future goals contributing to the pearl millet value chain we are looking for:

- a comprehensive food processing technology of millet linked to a thriving and profitable market-driven food sector to expand market access for farmers and local processors in Senegal and in the ECOSWAS region (4 to 5 years project).
- improved agro-processing of millet with processing and packaging that are critical to a vibrant food sector (3 to 4 years project).
- Development of high quality millet products (instant “arraw”/and or couscous, whole grain millet products, high bran millet products, improved infant millet based products). These will be focused on nutritive value and potential health benefits of millet grains and their fractions to support efforts for promoting their consumption (5 years project).
- Working on high-quality millet products for industrial uses (4 to 5 years project).

Constraints/Needs to move forward

Key constraints that need to be addressed in our future goals:

- Limited funding is one of the key constraints
- Need of capacity building (training and equipment) on **bioaccessibility and bioavailability analyses** (and all related state-of-the-art equipment).
- Real needs to work on fortifying local cereals including millet instead of wheat.
- Improved packaging system in order to compete with imported cereal products.
- Provide easy-to-handle, ready-to-cook or ready-to-eat, and safe products and meals at a commercial scale to feed large populations in urban and rural areas.
- Use of millet grains as replacement in wheat composite flours, complementary food, and food blends

Partnership/Acknowledgements

- USAID through Initiative Millet and Sorghum (INSORMIL)
- West Africa Agricultural Productivity Program (WAAPP)
- Feed the Future through USAID/Sorghum Millet Innovation Lab
- Feed the Future through USAID/Food Processing Innovation Lab
- Feed the Future through USAID/Sorghum Intensive and Innovative Lab (SIIL)
- ICRISAT
- CORAF/WECARD
- USDA CLUSA/PSEM for previous and further collaborations