Breeding Pipeline: Fonio 2011-2017

**Context**

Fonio (*Digitaria exilis* Stapf.) is one of the oldest cereals in Africa and has many ecotypes. It grows well on degraded land and is usually grown at the end of the crop rotation cycle, providing farmers, particularly women, with both self-provisioning and income generation opportunities. Only a few fonio varieties are usually cultivated in Mali. Yields vary between 400-600 kg/ha and can reach 1000 kg/ha on farmer field depending on crop management. Farmers lack access to information about new seed varieties, agronomical advice, and cost-efficient processing options. There has been renewed interest in consuming fonio in the urban centers, as it is a suitable dietary alternative for people suffering from diabetes or obesity.

**Value heterogeneity: build on and enhance diversity**

**Stakeholder participation; Varietal testings; Multi-functional varieties**

2014: A multi-location analysis revealed highly significant differences between ecotypes in terms of yield and earliness. Farmers selected 6 fonio ecotypes of interest in demonstration plots:

- 4 of them have yields 21-40% higher than the local check variety.
- 2 are early maturing. Flowering periods are between 55 and 90 days, which allows each farmer to choose the variety which is compatible with her or his cultural calendar.
- The producers also identified genotypes with big grains. The thickness of grains is a favorable characteristic on the market.

**Capacity building seed production; Farmer managed seed production**

2015: The associations who are members of the Mandela women’s cooperative were trained in seed production techniques and then produced 173 kg of 4 different varieties of fonio seed. 2017: training in 3 additional districts, 68 fonio seed production plots were installed in 14 villages on 37 ha with 13 varieties.

**More appropriate variety testing under targeted conditions**

2017: 29 mother trials and 386 baby trials were undertaken on station and in 12 villages. Objectives were to evaluate fonio varieties and fertilization options.

**Promoting equity through investments that favor the disadvantaged and vulnerable**

Provision of fonio decortication equipment has strengthened the fonio processing cooperatives in the Mandela and Torah villages: Since 2013, the quantity of shelled paddy fonio passed from 5,850 kg to 13,600 kg; which is a growth rate of about 231%. Husking lightens women’s work and adds value.

**Look for intersections and interactions among multiple, interrelated pathways of change**

Characterizing agrobiodiversity; modern breeding tools

50 Malian Fonio accessions were genotyped by sequencing. A Principal Component Analysis (PCA) revealed that the analysed samples mainly clustered into 3 groups that largely corresponds to geographic origin.

**Make the research process empowering: build social, technical, and methodological capital through the farmer-researcher and co-creation & co-evaluation processes**

- Farmer access to high quality, diverse seed varieties
  2017: Seed requirements increasing: farmers from 3 districts requested over 3000 kg of 11 different ecotypes of seed that would cover 120 ha. Farmers chose based on gender, objectives, agroecology, and based on previous trials.

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