Technologies for African
Agricultural Transformation

TAAT INVESTORS FORUM

Showcasing TAAT Technologies

15 February 2022: 1000 -1600 (WAT)

Bio-fortified sorghum and millet varieties

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TAAT Technology
Bio-fortified sorghum & millet varieties

https://www.icrisat.org/africas-first-biofortified-pearl-millet-variety-aims-to-combat-anaemia/

- Nutritious high yielding Sorghum and Millet varieties were developed with high Iron content (Fe: 45-79 ppm) and high Zinc content (Zn: 32-64 ppm), drought tolerant, early maturing, tolerant to diseases and heat
- A pool of cultivars composed of Open Pollinated Varieties (OPVs) and Hybrids with grain yield advantage of more than 30% over the local and improved checks of choice
- The OPV millet include GB 8735 (Gajera Mota), Chakti and ICRI-Tabi
- The OPV sorghum include mainly Jakunbe, Jiguikala, Soumba, Fambe B and Lata
- Sorghum Hybrids Pablo and Fadda, rich in iron and proteins has a yield advantage of 30% to 40% over the local check

Licensing
- Classified as Public Goods and royalty-free for multiplication and sales by farmers seed growers and private companies/ enterprises; but may require certification following national guidelines

Commodity
- Sorghum and Millet

Commercialization
- The seeds are commercially available in many countries, particularly from the private seed companies and farmers' cooperatives

Value Chain Position
- Production

Production cost (Certified seed production)
- Foundation seed 4 kg/ha (millet); 8 kg/ha (sorghum)
- Fertilizer microdose ➔ 60 kg NPK/ha; 20 kg Urea/ha
- Weeding two weeding
- Harvest – Local cost dependent.

Geographical Coverage
- adapted to the sub-Saharan African regions agro-ecological conditions with rainfall between 400 mm and 1000 mm
- All the OPVs are registered in the ECOWAS/WAEMU/CILSS regional seed catalogue (2016-2018)c

Potential profitability
- Profitable as food grain and cash
- Provide better grain yield than the local landrace
- Offer significantly better food quality and quantity
- Have higher iron and zinc content, which is good against the malnutrition of children women
- Recent studies show that Millets can combat anemia, and reduced the risk of developing type 2 diabetes and were useful for managing type 2 diabetes

Problems Solved and Benefits
- Child malnutrition, Adult health,
- Adverse effect of striga weeds,
- Effect of drought and heat,
- Diseases,

Links to Associated Technologies:

- The cultivation of Bio-fortified sorghum and millet cultivars for nutritious and high grain yield requires that farmers also invest in inputs (seed, fertilizer), and GAPs in order to achieve the desired yields in a profitable manner.
  - Applying organic and mineral fertilizer microdose is the best option for profitable production of the bio-fortified sorghum and millet.

Historical interactions with the private sector (Senegal)

Sorghum and Millet Compact (S&MC)								
Name of technology / Innovation	Scaling agreement - no income	License agreement funds generating	Country license or scaling agreement Implemented	Impact creation (ton/seeds)	Ha treated	Farmers benefited	ROI (Farmer)	ROI (private sector)
Bio-fortified varieties (OPV) of Sorghum & millet	NA	NA	NA	320	200			

Double purpose sorghum & Millet varieties

Double purpose sorghum variety

TAAT Technology
Dual-purpose sorghum & millet varieties

https://www.icrisat.org/new-multipurpose-sorghum-variety-captures-attention-in-burkina-faso/

- Sweet and Juicy stem & stay green
- Grain Yield - 2.5 - 4t/ha
- Stover yield - 10 - 15t/ha
- Tolerant to drought & *Striga*,
- Maturity – 105 days
- ***Digestibility In-vitro (49 %)***
- The sorghum cultivars include *Soubatimi, Tiandougou coura, Jiguikala, Seguifa* and *Peke* (OPVs) *Fadda, Sewa, Nieleni, Grinkan Yerewolo, Sassilon and Sariasso 22* (Hybrids).
- The millet cultivars include *MISARI 1 (OPV), MISARI 2, NAFAGNON (Hybrid), ICMV IS 89305, Mil de Siaka (ICMV 167005), ICMV IS 94206, ICMH 177111, SOSAT-C88, Toroniou C, Synthetique 00-06, Synthetique 03-03 and Thialack 2*

Potential profitability
- Profitable as food grain, stover and cash
- Stay green
- Provide better grain yield than the local landrace
- Offer significantly better food quality and quantity
- Good quality stover for animal feeding
- Contributes to the intensification of crop-livestock integration
- Suggest options toward prevention of farmer vs herders' conflict

Commodity
- Sorghum and Millet

Geographical Coverage
- adapted to the sub-Saharan African regions agro-ecological conditions
- Zones with rainfal 600mm - 1000 mm
- All the OPVs are registered in the ECOWAS/WAEMU/CILSS regional seed catalogue (2016-2018)c

Licensing
- Classified as Public Goods and royalty-free for multiplication and sales by farmers seed growers and private companies/ enterprises; but may require certification following national guidelines

Commercialization

The dual-purpose sorghum and millet cultivars (OPVs and Hybrids) seeds are produced and commercialized through the Formal Seed System

Problems Solved and Benefits
- Human food
- Animal feed,
- Adverse effect of striga weeds,
- Effect of drought and heat,
- Farmers vs herders' conflicts

Production cost (Dual purpose Sorghum and millet)
- Foundation seed 4 kg/ha (millet); 8 kg/ha (sorghum)
- Fertilizer microdose → 60 kg NPK/ha; 20 kg Urea/ha
- Weeding two weeding
- Harvest – Local cost dependent.

Value Chain Position
- Production and crop-livestock integration

Links to Associated Technologies:
- The cultivation of Dual-purpose sorghum and millet cultivars for human and livestock food requires that farmers also invest in inputs (seed, fertilizer), and GAPs in order to achieve the desired yields in a profitable manner.
- Applying organic and mineral fertilizer microdose is the best option for profitable production of the dual-purpose sorghum and millet.

Historical interactions with the private sector (Burkina Faso, Mali, Niger)

Sorghum and Millet Compact (S&MC)								
Name of technology / Innovation	Scalling agreement - no income	License agreement funds generating	Country license or scaling agreement Implemented	Impact creation (ton/seeds)	Ha treated	Farmers benefited	ROI (Farmer)	ROI (private sector)
Double purpose Drought and Striga tolerant variety	NA	NA	NA	42 (Mali, Burkina Faso, Niger)				

Organic & Mineral Fertilizer Micro-dose

Organic & Mineral Fertilizer Micro-dose

TAAT Technology
Organic & mineral fertilizer micro-dose

https://www.icrisat.org/impacts/impact-stories/icrisat-is-fertilizer-microdosing.pdf

- Application of "three-finger pinch" or "full bottle cap" (6 g per hill for a total of 60 kg/ha for compound fertilizer NPK (15-15-15); 2 g per hill for a total of 20 kg/ha for DAP (18-46-0)) in the seed planting hole at sowing or at the base of the plants two weeks after planting
- Increase fertilizer use efficiency, reduce investment costs to resource-poor small-scale farmers, thereby increasing crop growth and productivity
- Application of two handful (equivalent to 200g dry matter) of compost in the planting hole before planting

Geographical Coverage
- The Micro-dose Fertilizer Application technology is appropriate for the Sahel poor soils and equivalent sub-Saharan African agro-ecological regions

Commodity
- Cereal, leguminous crop and vegetables

Problems Solved and Benefits
- Soil fertility
- Low crop production
- Fertilizer affordability for farmers
- Fertilizer use efficiency

Value Chain Position
- ☐ Production

Potential profitability
- A timely applied pinch can result in crop yield increases ranging from 43% to 120%.
- Significantly increases the agronomic and the economic efficiency of nutrient and water use for smallholder farmers
- Increased fertilizer use from 13% to 27% in the pilot sites

Production cost
- Cost to train trainers and train farmers on the technology (Local context dependent).
- 60 kg/ha of NPK compared to 120 kg/ha for the recommended rate
- 20 kg/ha of Urea compared to 100 kg/ha recommended

Licensing
- The Fertilizer Micro-dose Application technology strategy was developed by ICRISAT. It remains a public good and therefore, there is no need for certification

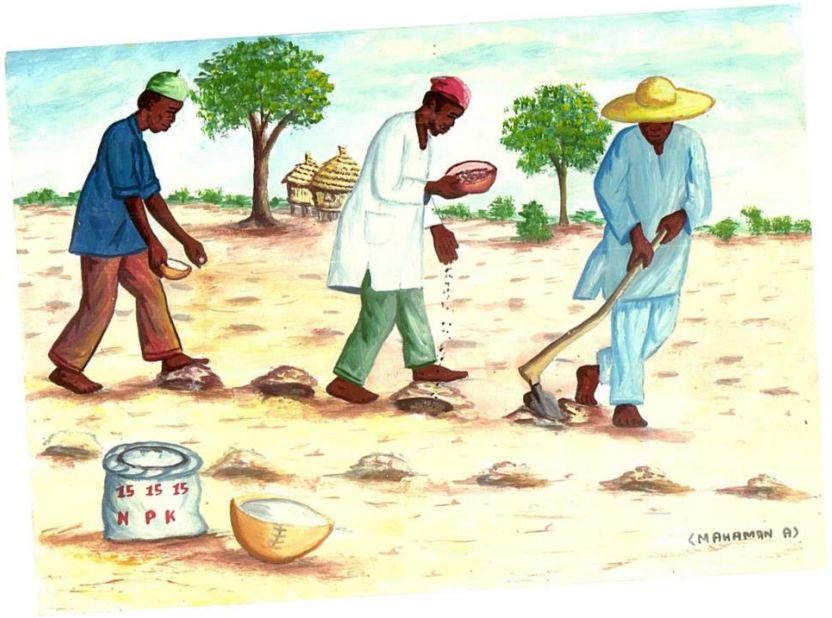
Commercialization
- Make sure input is provided at farmers' doorstep for timely delivery. Creating local input shops will help cooperatives

Links to Associated Technologies:

- Organic and mineral fertilizer microdosing application is considered as an option of Integrated Soil Fertility management
- This technology is also used to contribute to striga management
- It is an option used for rehabilitation of degraded land when organic fertilizer is combined with zai pits

Fertilizer Micro-dose – Mechanized Application

Fertilizer Micro-dose – Mechanized Application



TAAT Technology
Mineral fertilizer micro-dose - Mechanization

https://africa-rising.net/mechanizing-fertilizer-microdosing-mali/

"Sénékéla" motorized planter for Mineral fertilizer microdose application

The planter consists of three essential parts:

- The hopper containing the distributor disc
- The engine is equipped with four (04) wheels including two rear driving wheels and two front wheels driving the distributor disc
- The soil covering parts: sowing coulter, chute, skimmer and press wheel
- The plotter determines the spacing between two sowing lines
- The distributor disc applies the fertilizer in micro-doses and plants the seed at regular intervals between two pockets

Production cost

- The "Sénékéla" motorized planter is locally fabricated in Mali except the engines (four stroke-engine from motorbike), which is imported
- The costs range from $915 to $1,000 depending on the exchange rates

Geographical Coverage

- Adapted to the sub-Saharan African regions agro-ecological conditions
- Used everywhere suitable for Fertilizer microdose application

Commodity

- Cereals, legumes and vegetables

Problems Solved and Benefits

- Soil fertility
- Low crop production
- Fertilizer affordability for farmers
- Fertilizer use efficiency
- The reduction of the arduousness of the work

Value Chain Position

- Production

Potential profitability

- The machine comes with one-year guarantee and a lifespan of 10 years if well maintained.
- It is profitable with low operating cost (fuel, wages and maintenance)
- Compliance with the optimal sowing period and plant population
- Minimum fuel consumption (gasoline/petrol) per hectare (0.5 to 2.5 liters/ha)
- The reduction of production costs (quantity of fertilizers and seeds)

Licensing

- The design of the machine is the property of IER who is in charge of the production locally.
- Some blueprints and detailed building design for "Sénékéla exist at IER

Links to Associated Technologies:

- Technology meant to reduce drudgery on farmers at planting while applying mineral fertilizer microdose
- Row planning and standard planting population as Good Agronomic Practices