Farmers contribution to improved sorghum development and diffusion in West Africa: case of hybrids in Mali

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Outlines

1. Context of West Africa
2. Farmers contribution to hybrids development in Mali
3. Farmers role in sorghum seed system in Mali
4. Challenges and mitigations
5. Conclusion
**Context**

✓ In West Africa, Sorghum is grown on around 14 000 000 ha

✓ WA accounts 31% of world area harvested in Sorghum and 45% of Africa total area

✓ Mali represents 11% of sorghum area and production in WA

✓ Range of rainfall: 400- to 1200+

✓ Sorghum grown by smallholder farmers
- Sorghum, important staple food for millions of population in WA
- Sorghum mainly produced for the household use
- Stover, important role livestock feeding
- Market also important: grain or other products
✓ Diversity varieties used by farmers to response to these various needs

✓ However, grain yield still low

✓ Development of sorghum hybrids initiated to boost productivity

✓ Local seed systems approached with Farmer Organizations (FOs)

✓ Model based on:
  - (1) Seeds produced and sold locally by FOs
  - (2) locally adapted communication tools and marketing approaches
Farmers contribution to Sorghum hybrids development

✓ Trial of 15 hybrids (+check) implemented by 27 farmers, 3 years, 3 zones in Mali

✓ Data on grain yield, farmers’ preferences based on agronomic traits and

\[
\text{Preference (\%)} = \frac{[\text{NWC} \times 1] + [\text{NYC} \times 0.5] + [\text{NRC} \times 0]}{\text{NWC} + \text{NYC} + \text{NRC}} \times 100
\]

NWC, number of white cards; NYC, number of yellow cards; NRC number of red cards
Hybrid yields based on-farm data

- Over 70% of Short hybrids > 1.7 t/ha (Local check, Tieble)
- ~ 50% of Tall hybrids > Tieble
- Hybrids~17% to 37% yield advantage over check
- Grain yield gain: 289 kg/ha to 629 kg/ha over Tieble
- Kante et al. (2017): 50 kg/ha (0.05 t/ha) of hybrid yield over the local check, recovers seed price.
Grain yield advantage and High benefit with hybrids compared to OPV and local variety independent to the production environment.
Hybrids food yield and quality assessment

✓ Grain adaptation to the processing evaluated by women (food yield)

✓ Appreciation of food: colour, consistence, taste = global appreciation
Farmers role in Hybrids Seed production and diffusion in Mali

- Farmers cooperatives trained for seed production technics: OPVs and hybrid seed

- Sorghum certified seed production boosted (~6t in 2009 to ~82t in 2017)

- Hybrid seed = 0.5 t in 2009 (beginning of hybrid seed production) and average of 33 t for the past 3 years

- Hybrid seed = 4% of total sorghum seed (2009) to an average of 48% for the last 5 years
For hybrids and OPVs dissemination FOs used:

- Demonstration plots
- Rural radios
- Seed fairs
- Recruited younh
- Seed outlets in villages

Hybrids covered ~ 5,000 ha in Mali in 2017 and

Hybrids ~ $US 32,000 ($US34,000 for OPVs) from 2016 production
Farmers contribution to new hybrids development

New seed parents/female parents

- Until 2013, only 05 hybrid female parents
- Female pool broadened using existing B lines and local material
- 36 A/B pairs fixed lines developed
- Over 120 hybrids developed in 2016/2017
New hybrids developed

- 122 new hybrids developed in 2016/2017
- Nurseries in 3 zones, 12 farmers/zone (36 farmers)
- 39 new hybrids: 30% to 86% of gain yield over check hybrid *Fadda* and 47% to 110% over the local check *Tieble*
- 17 hybrids with better preference (60 to 75%) vs *Tieble* (58%) and *Fadda* (48%)
Challenges and mitigations

- Less support from donors to breeding programs, funds oriented mostly to diffusion (breeder seed)
- Lack of planning in seed production/seed buyers
- High costs of seed certification
- Cultural barriers in some zones about seed buying & hybrids as farmers traditionally use their own seed annually
- Weakness of private companies in seed value chain
- Seed value chain approach important to overcome challenges with emphasis on awareness raising
Conclusion

✔ Evidence of sorghum hybrid potential and benefits in West Africa across various conditions of farmers cropping systems

✔ Grain yield advantage of 30% over the check

✔ Farmers involved from early stage of breeding to seed production and marketing

✔ Working with Farmers’ organizations key to reach target farmers and realize a useful gain

✔ Model with Farmers organization increases the sustainability of seed system

✔ Need to strengthen relation FOs-private companies for large scale diffusion and more income for seed producers.