



Sesame: the new white gold for smallholder farmers in Burkina Faso and Mali?

Introduction

Sesame has over the last decade emerged as an important agricultural commodity in Burkina Faso, and Mali. Whereas cotton has in the past been labelled as the “white gold”, agricultural producers are now diversifying their cash income by also growing sesame. This paper investigates how the sesame sector can be supported to make sesame the “new white gold” for farmers in Burkina Faso and Mali. The insights are gained from a CFC supported project implemented by Helvetas, IFDC and KIT from 2011 till 2014^{1,2}

Emergence of sesame as a cash crop

Since 2000, sesame has developed from a crop of marginal importance to a major agricultural export commodity in Burkina Faso and Mali. The volumes exported increased more than ten-fold (Figure 1) and the area dedicated to sesame production increased five times in Burkina Faso and 2.5 times in Mali. The total farm gate value of the crop has grown dramatically to over 60 million USD in Burkina Faso in 2011 (Figure 2). Production has increased since, to 137,000 tonnes in 2013, while also prices increased. Using a conservative farm gate price estimate of 450 FCFA the total farm gate value in 2013 would come to 124 million USD.

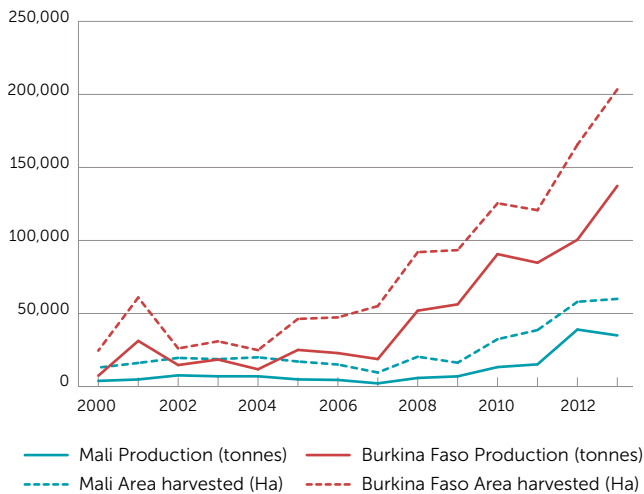
¹The project was entitled Development of Export Oriented Sesame Production and Processing in Burkina Faso and Mali (CFC/FIGOOF/27). The project was implemented under overall responsibility of the Royal Tropical Institute (KIT – The Netherlands), with country-specific activities by Helvetas in Burkina Faso and IFDC in Mali. The CFC-funding of USD 1,250,000 was covered in part through a contribution of USD 750,000 from the OPEC Fund for International Development.

²This paper is a shortened version of a longer publication: Gildemacher, P., Audet-Bélanger, G., Mangnus, E., Van de Pol, F., Tiombiano, D., Sanogo, K., 2015. Sesame sector development; lessons learned in Burkina Faso and Mali. KIT & CFC, Amsterdam. Also available in French. Corresponding author: p.gildemacher@kit.nl



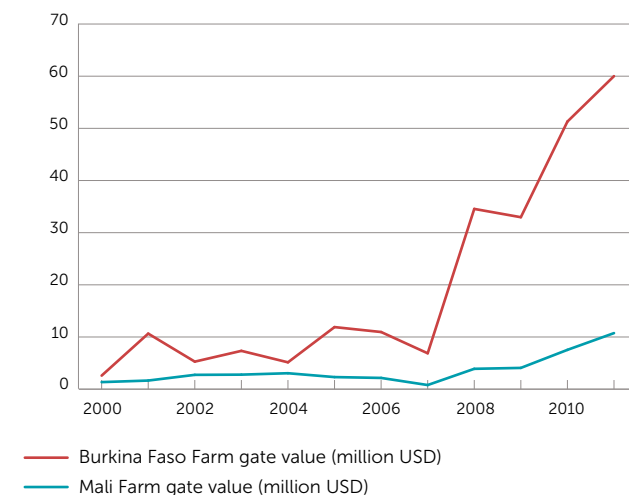
KIT

Figure 1: Evolution of production and export of sesame volumes from Burkina Faso and Mali, 2000-2013



Source: FAOSTAT, August 2015

Figure 2: Total estimated farm gate value^a of sesame in Burkina Faso and Mali, 2000-2013 (mln. USD)



^a Total farm gate value calculated based on price data from Mali, by lack of a continuous price data series from Burkina Faso)

Source: FAOSTAT, August 2015

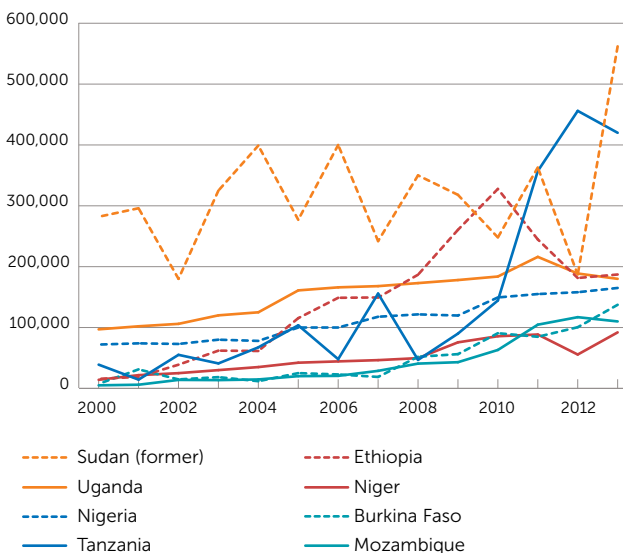
The sesame sector is entirely export oriented, there is virtually no local market. Burkina Faso and Mali have sesame available from the end of November. International buyers, their local agents and local traders at different levels fiercely compete to purchase sesame in the short period from the end of November to February. The strong demand for sesame puts pressure on quality control, as buyers first and foremost seek to satisfy their desired volumes.

The fast increase in sesame production has been triggered by a growing worldwide demand. Chinese sesame imports in

particular have increased, probably as the result of increasing consumption resulting from household income increases. A second factor is the desire from international buyers to source their supply from a diverse range of countries. Sesame is mainly grown in semi-arid, rainfall dependent areas where there is a single, and often unreliable, rainy season. Buyers need a supply strategy that sources from different areas worldwide.

The increase in sesame production in Mali and Burkina Faso is not unique. Other major African sesame producing countries are experiencing similar growth in production volumes (Figure 3)

Figure 3: Evolution of production and export of sesame volumes from major African sesame producing countries, 2000-2013 (tonnes/year)



Source: FAOSTAT, August 2015

Sesame is a suitable crop for farmers in Burkina Faso and Mali

Entry into sesame production is easy, for any type or size of farmer. Growing sesame can be done with relatively little inputs. Even farmers with little else than family labor and land are able to produce sesame, although modest investments in fertilizer and seed do increase productivity. The modest need for cash investments makes sesame a very accessible cash crop, more so than cotton, which does require substantial investment in seed, fertilizer and crop protection. The majority of farmers in Burkina Faso and Mali produce sesame without investment in external inputs. Only 15 and 21% of producers was using fertilizer in Burkina Faso and Mali respectively (own data). Quality seed from a reliable source was used by 5% of producers in Burkina Faso (source DGPER, 2011-2012) and 17% of producers in Mali (source CPS, 2012-2013).



Transport of sesame stalks, Mali

Marketing sesame is easy for producers, specifically in Burkina Faso. There is a country-wide coverage by sesame collectors who have field brokers going to farms to buy sesame. There is a fierce competition amongst sesame buyers, which gives farmers a reasonable bargaining power. Sesame is usually paid cash immediately upon collection, which is highly appreciated by resource-poor farmers. This is very different from cotton, as the payment procedures by the cotton societies take time.

A last important feature of sesame is that it is relatively hardy, requires little rainfall, during a short period, and is relatively tolerant to pockets of drought. This makes it suitable for areas where rainfall is or has become too unreliable to grow cotton as a cash crop. In Burkina Faso sesame is grown in areas with a little rainfall as 500 mm per year, where there are no alternative cash crops possible without irrigation.

The CFC funded sesame sector development project

Clearly, the sesame sector provided opportunities to contribute to rural development, reason for the CFC to support a sesame sector development project in Mali and Burkina Faso. The objective of the project was to increase the value and volume of quality sesame produced and marketed from the two countries. The project intervened at three levels, productivity increase, value chain development and processing.

Productivity increase in Farmer Field School demonstrations

Although sesame production is profitable at current productivity levels, and prices seemed to rise annually, there will come a moment when production efficiency and price will become important factors for international competitiveness. The recorded average yield in Burkina Faso was 555 kg per hectare in 2011, compared to 445 kg per hectare in Mali in 2012, according to national statistics. The 25% best producers in Burkina Faso were however producing more than 750 kg of sesame per hectare, showing the potential for productivity increase. With sesame experts from different organisations a sesame Farmer Field Schools (FFS) programme, was initiated. A curriculum was developed with public, private, non-governmental and farmer organizations (KIT et al., 2012), FFS facilitators were trained within the participating organisations. In total 188 field facilitators were trained, and they conducted season-long sesame Farmer Field Schools with a total of 12,782 farmers.

The farmer field schools evolved around demonstration plots in which current farmer practices were compared with the proposed improved practices. The proposed improved practices increased yields by an average of 62% and 28% in Burkina Faso and Mali, respectively (Table 1). The main differences between common farmer practices and improved practices are the application of modest amounts of fertilizer, sowing fewer seeds per pocket, thinning of plants to two stems per planting hole,

and harvesting at the appropriate time. The difference in yield increase between FFS groups in Burkina Faso and Mali is hard to explain. Possibly the team in Mali has been less focused on selecting farmer not previously trained in sesame production. Obviously better results can be obtained when successfully selecting those farmers who need training on good sesame farming practices the most.

Table 1: Difference in yield between current farmer practice and improved practices in Farmer Field Schools in Burkina Faso and Mali, 2010-2013 (kg/ha.)

	Burkina Faso	Mali
FFS, farmer practice	411	364
FFS, improved practice	667	465
% increase FFS	62	28

Effects of modest fertilizer application

Among producers in Burkina Faso and Mali it is widely believed that the crop responds poorly to fertilizer. Like any other crop though, limitations in soil nutrients affect crop growth. Clear fertilizer recommendations were however lacking. Simple farmer managed fertilizer trials were implemented in 16 locations in Burkina Faso with best-bet dosages of available fertilizers. The trial results (Table 2) show that considerable yield benefits can be obtained by farmers with use of modest amounts of fertilizer. Good results were obtained from the NPK (14:23:14) applied as

a single micro-dose three weeks after emergence. An additional side-dressing of Urea 40 days after plant emergence provided additional yield benefits in Kourritenga, but not in Gourma. A side dressing of Urea alone 40 days after emergence clearly provided lesser yield benefits than the NPK treatment.

Table 2: Fertilizer response of sesame in farmer managed trials in Burkina Faso, 2013.

	Kourritenga		Gourma	
	(kg/ha)	Additional %	(kg/ha)	Additional %
NPK (14:43:14) 75kg	495	70	759	81
Urea 50kg	352	20	584	39
NPK (14:43:14) 75kg + Urea 25kg	578	98	750	78
Control	292	-	420	-

Source: Own data, field trials 2013

Economic analysis shows that the highest additional net profit can be obtained through the combined application of 75kg of NPK and 25kg of Urea, while the return on investment is highest for a single application of 75kg NPK (Table 3). Considering the ease of application and that it provides the highest return on investment, a single dose of 75kg of NPK (14:23:14) per hectare can be advised. A blanket advice for fertilizer use is however not ideal as crop response to fertilizer is highly dependent on the soil type and land-use history. For the time being however, farmers are fairly sure to get a healthy return on their investment using this "best-bet" advice of 75kg NPK per hectare.

Photo: Mahamane Touré



Hand cleaning of sesame, Mali

Table 3: Marginal benefit analysis of fertilizer use on sesame in Burkina Faso, 2013

	NPK 75kg	Urea 50kg	NPK 75kg +Urea 25kg
Additional yield compared to control (kg/ha)^a	271	111	308
Gross marginal benefit (FCFA/ha)	135,508	55,703	153,867
Fertilizer cost (FCFA/ha)	30,000	17,000	38,500
Additional labour cost (FCFA/ha)	2,000	2,000	4,000
Net marginal benefit (FCFA/ha)	103,508	36,703	111,367
Return on investment (FCFA/FCFA)	3.2	1.9	2.6

^a Based on a presumed farm gate price of 500 FCFA/kg

Source: Own data, field trials 2013

The current mixture of NPK has been proportioned specifically for cotton farming in the main cotton zones of the two countries. Considering the fast growing importance of sesame in Burkina Faso and Mali, it could be worthwhile to look into the development of a tailored fertilizer for sesame.

In addition to the use of fertilizer, the use of manure and/or compost, provided it is well decomposed, is advised to assure maintenance of soil organic matter levels and assure the availability of micro-nutrients. As the availability of both compost and manure is small, no specific advice is required, other than to apply whatever amount available, in addition to the above recommended chemical fertilizer.

Effect of high quality seed

Most farmers in Burkina Faso and Mali obtain their seed for the next seasons from their own plot. This results in a relatively stable, location specific, mixture of genetic characteristics within the sesame population planted called "sésame bigaré", as if it were a specific variety. The quality of bigaré sesame is not all that bad, with the exports of this sesame as the important proof. However, there are gains to be expected from the use of more pure seed of a single variety, such as higher yields, oil content, homogenous color and size of the sesame seed. Finally, a more homogenous field makes harvesting easier reduces losses as a result of shattering. The actual yield benefits of pure good quality seed had however never been quantified.

In farmer managed trials in Burkina Faso the performance of pure seed of the S42 variety was compared to the local *Bigarré* seed. The use of high quality seed resulted in an average 45% yield benefit compared to locally recycled seed (Table 4). This depended a lot on location though: in Gourma province, a modest average yield increase of 12% was recorded, while yields

in Kourritenga more than doubled. This could be explained by the history of sesame production in both areas. In Kourritenga, sesame production dates back much further and farmers have become accustomed to re-using their own seed. In Gourma, sesame production has recently become an important economic activity and the use of quality seed has been promoted from the start and farmers are relatively well organised to assure access to quality seed. The regular influx of quality seed and higher seed renewal rates, has a positive impact on the general quality of recycled (bigaré) seed in the Gourma province.

Table 4: Yield difference between pure seed of a single variety and bigaré seed of sesame, Burkina Faso, 2013 (kg/ha)

	Local seed	Certified seed	Difference (kg)	Difference (%)
Kourittenga	262	564	302	115
Gourma	565	634	70	12
Average	413	599	186	45

Source: Own data, field trials 2013

If the average yield increase is used as an indication, the marginal net benefit of the use of high quality seed can be calculated (Table 5). High quality seed use resulted in an average yield increase of 186 kg per hectare, which is worth 93,000 FCFA (assuming a price of 500 FCFA/kilo). This means that for each investment of a single FCFA in high quality seed, it is possible to obtain a phenomenal return on investment of 19 FCFA. Profitable indeed!

Table 5: Marginal net benefit of the use of high quality pure sesame seed, Burkina Faso, 2013

Additional costs (FCFA/ha)	4,500
Additional yield (kg/ha)	186
Additional gross revenue (FCFA/ha)	93,000
Additional net revenue (FCFA/ha)	88,500
Return on investment (FCFA/FCFA)	19

Source: Own data, field trials 2013

Sesame value chain development

The sesame collection chain is presented in Figure 3. In both countries, producers have a number of competing options to sell their sesame: they can market it through a farmer group or through a cooperative; they can also sell to a village trader, who buys at the market or at a collection point; or they can sell to field brokers who travel to the farm to buy sesame directly from the producer. Exporters are local business people, or buying agents operating on behalf of foreign traders and processors. Exporters buy from intermediate traders, but also employ field

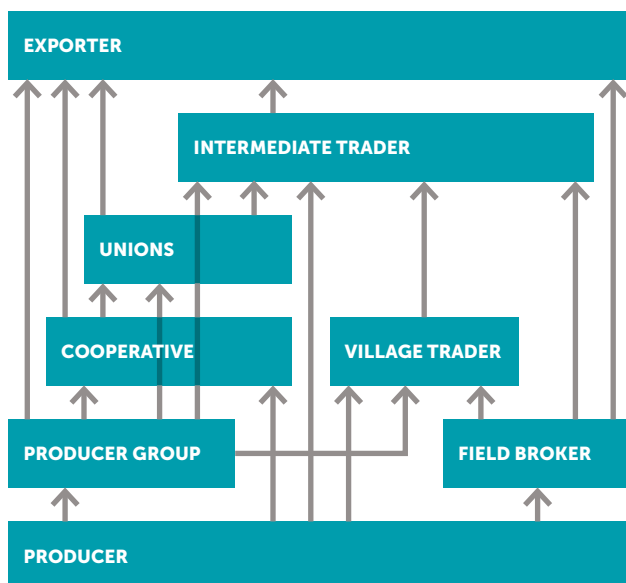


Photo: Mahamane Touré

Packaging cleaned sesame in the sesame cleaning plant of PROSEMA, Mali

brokers directly. Intermediate traders can decide to stockpile sesame to manipulate the supply and speculate on rising prices, before selling to exporters. They often have direct relations with exporters, and part of their operations can include acting as buying agents for an exporter (using the exporter's money), combined with purchases with their own capital.

Figure 3: Graphic representation of the sesame collection chain in Burkina Faso and Mali



The percentage of producers who sell to a field broker contracted by a larger buyer from outside the community is 75% in Burkina Faso, compared to 23% in Mali. Those selling to a

cooperative or a farmer organization represent only 11% in Burkina Faso, versus 50% in Mali (Table 6). The latter figure is suspected to be inflated because farmers feel obliged to indicate their cooperative as their main buyer, while actually selling a large proportion of their production elsewhere. Still it shows that organized group marketing is much more important in Mali than in Burkina Faso. The explanation could be that sesame has become a nation-wide commodity in Burkina Faso, with a fine-meshed network of collectors, while in Mali sesame production is more dispersed. To attract buyers, Malian farmers have to make efforts to bulk their produce.

Table 6: Fractions of sesame producers selling to different first buyers in Burkina Faso and Mali, 2013

	Burkina Faso	Mali	Price offered FCFA/kg
Individual field broker	4%	18%	358
Village buyer	5%	8%	n/a
Cooperative or farmer group	11%	50%	391
Field broker, from outside the village	75%	23%	433
Sold in town	5%	2%	400

Source: Sesame chain survey

Given that sesame is largely paid for immediately upon collection, trade finance is a major constraint, especially because all collection takes place in a period of only two to three months. The estimated cash requirement for sesame collection in Burkina Faso

in 2012 was roughly 80 million USD. Exporters combine funding from different sources. An important source is funding advances from foreign customers, however, this means that the exporter's client list is set in advance and results in lower profit margins. A second source of funding is an exporter's own capital, combined with loans from other business people, including family. Finally, the banking system can also provide funding but it is hesitant (and slow) in stepping into the market of short term trade finance, even though it would theoretically be valuable for them.

Sesame value addition and processing

Sesame from Burkina Faso and Mali is currently exported as crude bulk product. Although this is currently highly profitable, the CFC looked into options for value addition.

Organic Sesame

Certified organic sesame production is a niche product in Burkina Faso, however, its export is currently facing difficulties. Much of the organically certified sesame "leaks" away into the conventional sesame market as prices for conventional sesame regularly peak above the agreed prices for organic sesame. Organic sesame buyers are as a consequence faced with a supply shortage and fail to satisfy the contracted volumes. Under the current conditions, investment in organic sesame production, certification and marketing is high risk, and less profitable than conventional sesame.

Sesame Oil

The bulk of the sesame purchased from Burkina Faso and Mali is used for the production of sesame oil. Local production of sesame oil could increase the export value. An added advantage of sesame oil production would be the reduction of the risk of export bans as a result of contamination with micro-organisms, most notably salmonella, which is common in sesame export worldwide.

Sesame oil is currently produced in both Burkina Faso and Mali on a minor scale, to serve small local and foreign niche markets. Overall however, the volume of sesame processed into oil is negligible and domestic consumption of sesame oil is largely non-existent in the two countries. A market and consumer study by the project in Mali indicated that the characteristics of the sesame oil produced in Mali were much appreciated. It is unlikely that with current sesame prices its oil can become a mainstream product. Imported palm oil is retailed at 800 FCFA per liter. Currently, the 2.25 kg of sesame required to produce 1 liter of oil costs at least 800 FCFA at the farm gate and a liter of oil costs around 2,000 FCFA. Still, consumers who tested the product indicated that a price of 1200-1300 FCFA could be low enough for them to consider using sesame oil occasionally. Possibly a modest share of the high-end market might be gained if sesame

oil could be produced in Mali in an efficient manner, and sesame is acquired at a price of around 300-400 FCFA is developed. The valorisation of the seedcake as animal feed could contribute to making sesame oil a profitable business case. To produce sesame oil for export a similar price can be anticipated, especially when contracts can be secured with larger buyers.

Still, export prices for crude sesame from Burkina Faso and Mali are such that a better profit can be made by collecting, stocking and exporting crude sesame, rather than by oil processing.

Pure and White Sesame

A simple form of value addition would be to export sesame of a higher grade of purity (being free of foreign matter). A related opportunity for value addition is to focus on white sesame, rather than mixed color sesame. For the bakery and confectionary use of sesame, as well as for Tahini, large grain white sesame is required. Offering pure white sesame is one of the ways in which Burkina Faso and Mali could be more distinctive in the world market.

In the current market, there is little to no price incentive (up to 5%) for the production and collection of pure white sesame, and obtaining white sesame in Burkina Faso and Mali requires a bit of extra effort in the form of the use of high quality seed and taking care not to mix white and mixed lots during collection. This explains the difficulties traders have to acquire white sesame.

To improve the availability of white sesame, the major pre-requisite is a functioning sesame seed system which makes high quality seed of the current best variety, S42, available to producers. A program to select and promote new varieties which respond even better to the demand for white sesame would be strategic and could contribute to the future competitiveness of Burkina Faso and Mali on the international sesame market.

It is technically possible to obtain a more homogenous white sesame, of a high purity grade, by color sorting using an optical sorting machine, a Sortex. Considering the current lack of clear price incentives for pure white sesame it would only make sense to invest in a Sortex if specific clients have been identified and a supply of fairly pure S42, suitable for further sorting and cleaning, is secured from producers. Currently, only part of the sesame produced in Burkina Faso and Mali goes to sesame processors directly. Most sesame is bought by international intermediate transit traders from Europe and India, who often ship the sesame to their own cleaning facilities and redistribute it to the major end-clients. As the intermediate buyers have their own cleaning facilities, they are not inclined to pay generous premiums for better cleaned sesame. To make investments in cleaning and sorting facilities pay off, direct trade relations with large international sesame processors are needed.

Recommendations for future interventions in the sesame sector in Burkina Faso and Mali

Based on the lessons learned in the CFC supported project, a number of recommendations is formulated for consideration by future interventions.

Productivity increase

- Productivity increase is the most promising entry point for further sesame sector development.
- Promotion of high quality seed and modest fertilizer use can contribute to further productivity increase.
- The development of commercial quality seed production and marketing is worth investing in:
 - ▶ Develop (in Burkina Faso) and improve (in Mali) a pre-ordering and pre-financing system for (pre-)basic seed production
 - ▶ Support seed companies in the development of seed distribution systems allowing producers to buy high quality seed in small quantities locally;
 - ▶ Lobby for a halt to government-run subsidy schemes for sesame seed, as they distort the market and hinder private sector development.
- Further research into a compound fertilizer optimised for sesame would be helpful.
- Sesame variety selection is worth the effort to search for adapted large grain white varieties, varieties with high oil content, longer season varieties for the Southern parts of Mali and Burkina Faso.
- Research into pest and disease management is required. As sesame has become a major crop in Burkina Faso, risks of pest and disease outbreaks are mounting.
- The FFS approach was effective and can be further promoted, provided efforts are made to reach farmers who have not yet been trained.

- Sowing machines could be promoted to improve the timing of sowing and reduce drought damage as result of late planting.

Value chain development, value addition and processing

- Sesame exporters from Burkina Faso and Mali can be assisted with trade missions to and from Asian sesame processing countries, to develop direct trade relations.
- Develop a functioning sesame collection credit system with sesame exporters and banks to increase independence from intermediate buyers.
- Improve the capacity for national competitiveness and innovation through the transformation of efforts to develop a sesame "interprofession" into a lighter fit-for-purpose innovation platform.
- Very cautiously consider investing in organic sesame farming, as the required additional efforts are currently not being compensated by higher prices.
- Cautiously consider investing in sesame oil processing, under current market circumstances, as the trade in crude sesame is more lucrative.
- Cautiously consider investing in facilities to colour sort sesame, as a reliable supply of reasonably white sesame cannot currently be guaranteed.
- Assess, with entrepreneurs, the opportunity of value addition through sesame hulling.
- Support sesame exporters' investment in cleaning equipment through:
 - ▶ Co-funding investment in equipment;
 - ▶ Technical support during the installation and pilot use of cleaning equipment.

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Photo: Mahamane Toure



Sesame farmer field school in process, Mali