



# Assessment of Fertilizer Distribution Systems and Opportunities for Developing Fertilizer Blends MALI

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Executed by:



This assessment was conducted by the International Fertilizer Development Center (IFDC) and the African Fertilizer and Agribusiness Partnership (AFAP) for the Alliance for a Green Revolution in Africa (AGRA) as part of a consultancy for Assessment of Fertilizer Distribution Systems and Opportunities for Developing Fertilizer Blends. The views, information, and opinions expressed in this assessment are those of IFDC and AFAP and do not necessarily reflect the official policy or position of AGRA.

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## Acronyms & Abbreviations

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ADP	Agricultural Development Policy
AFAP	African Fertilizer and Agribusiness Partnership
AGRA	Alliance for a Green Revolution in Africa
APCAM	Assemblée Permanente des Chambres d'Agriculture du Mali
AS	ammonium sulfate
B	boron
BNDA	Banque Nationale de Développement Agricole
CAN	calcium ammonium nitrate
CMDT	Malian Company for Textile Development
CNE	National Committee of Fertilizers
CPS-SDR	Cellule de Planification et de Statistique du secteur Développement Rural
DAP	di-ammonium phosphate
DNA	Direction Nationale de l'Agriculture
DPA	Doucouré Partenaire Agricole
Ha	hectare
IER	Institut d'Economie Rurale
IFDC	International Fertilizer Development Center
ISFM	integrated soil fertility management
MAP	ammonium phosphate
MT	metric ton
NGO	non governmental organization
NPK	nitrogen phosphorus potassium
OCP	Office Chérifien des Phosphates
OHVN	Office of the Upper Niger Valley
OPA	Office of Agricultural Products
PR-PICA	Programme Régional de Production Intégrée du Coton en Afrique
SME	small and medium enterprise
SOGEFERT	Société Générale des Fertilisants
SSP	single superphosphate
SUKALA-SA	Complexe Sucrier du Kala Supérieur
SWOT	Strengths, Weaknesses, Opportunities, Threats
SYCOV	Syndicat des Producteurs de Coton et Vivriers
TSP	triple super phosphate
UNRIA	Union Nationale des Revendeurs d'Intrants Agricoles
WDI	World Development Indicators

# Assessment of Fertilizer Distribution and Opportunities for Developing Fertilizer Blends in Mali

## Introduction

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In the performance of this assessment, we conducted interviews with some 50 key players in the Malian fertilizer sector, including those in the public and private sector.

**Public Sector:** Department of Ministry (Ministry of Agriculture), technical services of producer management National Directorate of Agriculture (DNA), Planning and Statistics Unit of the Rural Development Sector (CPS-SDR), Malian Company for Textile Development (CMD), Office of the Upper Niger Valley (OHVN), Office du Niger, Sugar Complex of Upper Kala (SUKALA-SA) and Customs.

**Private Sector:** Fertilizer blend manufacturers and Distributors (Toguna Agro Industries, Doucouré Industrial Agro Partner (DPA), Société Malienne d'Équipement et de Commerce (SOMADECO), Organic Fertilizer Manufacturers (Green Elephant, Mali-Engrais), Agro dealers in Bamako, Ségou, Fana, Kati and Diago), producer organizations (C-SCPC) and producers in Kati and Diago, importers and manufacturers of blended fertilizers, distributors, agro dealers, large industrial sugar cane farms and smallholder farmers.

We reviewed policy and regulatory documents, and fertilizer recommendations from the Ministry of Agriculture for maize, millet, sorghum, and cowpea.

## Available Soil Information

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The major source of soil analysis in Mali appears to be some 1000 georeferenced soil samples clustered around 4 10\*10 km sentinel sites in the Segou region with some extending to Sikasso and Mopti, run in conjunction with OCP. It is unclear whether this information will be publicly available, and project may lack analysis for S, B, Zn, and Cu. Some investments in soils mapping are planned under an Islamic Development Bank loan, which is at an advanced stage of development but has yet to materialize.

## Inventories of Fertilizers Available in the Markets

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The main blends, including some that are under evaluation, are shown (by crop) in Table 1. Table 1 also shows the main straight fertilizers and compounds imported into in Mali, sorted by volume. These straight ingredients can be applied as is, but a significant portion are used to create fertilizer blends.

**Table 1. Main blends used in Mali (by crop), and principle fertilizers imported into Mali.**

Crop	Formulation	Comments
Cotton	During the 1990s, cotton formulations were developed for different agro-ecologies	
	14-22-12-7S-1B	Southern zones, heavy rainfall
	14-18-18-6S-1B	Central zones, medium rainfall
	22-13-12-7S-1B	Kita Zone (west) and San Zone (north)
	Urea 46N	All zones
	4 new formulations were developed by Toguna in collaboration with IER and PR-PICA	
	14-18-18+5S+1B+3CaO	
	15-10-20+5S+1B+3.5MgO	
	15-15-15+5S+1B+2.5MgO+2.5CaO	
	15-10-20+5S+1B+2.5MgO+2CaO	
Maize	15-15-15	
	16-16-16	
	17-17-17	
	23 13-13 +3.6S+2.6MgO +0.3B	Yara formulation
	17-17-17 +4S	
	25-12-15+3S+0.2B <sub>2</sub> O <sub>3</sub> +1MgO+0.2Zn	Evaluated by Toguna-IER for last two years
	17-17-17+4S+2MgO	Evaluated by Toguna-IER for last two years
	19-17-14+3S+2 CaO+2MgO+0.4Zn	Evaluated by Toguna-IER for last two years
	23-10-15+3S+2MgO+0.3Zn	Evaluated by Toguna-IER for last two years
Urea 46N		
Sorghum and millet	15-15-15	
	16-16-16	
	17-17-17	
	Urea 46N	
Irrigated rice	0-18-46 (DAP)	
	16-26-12-3.5 Mg-0.3 Zn (Nieleni)	
	13-12-12+14CaO+3.5S+2MgO+0.8Zn	Evaluated by Toguna-IER for last 3 years
	8-14-8 +21CaO+5S+2MgO+1Zn	Evaluated by Toguna-IER for last 3 years
	0-29-0 43CaO Granulated phosphate rock	Evaluated by Toguna-IER for last 3 years
Urea 46N		
Soft wheat	13-12-12 +14CaO+3.5S+2MgO+0.8Zn	Evaluated by Toguna-IER for last 3 years
	8-14-8 +21CaO+5S+2MgO+1Zn	Evaluated by Toguna-IER for last 3 years
	0-29-0 43CaO Granulated phosphate rock	Evaluated by Toguna-IER for last 3 years
	Urea 46N	
Cowpea	0-22-0 Super simple phosphate	
	0-23-15 + S +Mg +Zn +B	
	0-29-0 +43CaO granulated phosphate rock	
Groundnut	2N-15-7 +7S +27CaO +0.3B <sub>2</sub> O <sub>3</sub> +0.3Zn	Evaluated by Toguna-IER for last 3 years
	1.5-18P-8 +5S +26CaO+ 0.3B <sub>2</sub> O <sub>3</sub> +0.3Zn	Evaluated by Toguna-IER for last 3 years
	0-29-0 +43CaO granulated phosphate rock	Evaluated by Toguna-IER for last 3 years
Sugar cane	0-18-46 (DAP)	
	0-0-60 (KCl)	
	Urea 46N	
Potato	10-15-20+5S+0.3Zn+0.02B "YIRIWA"	
	10-10-20	Evaluated by Toguna-IER
	12-11-18-8S+2.7MgO+0.02Zn+0.015B	Evaluated by Toguna-IER

Fertilizer Name	2017 Volume (MT)
Urea	354,014
KCl	110,995
MAP	96,112
Ammonium sulfate (AS)	74,722
NPK compounds	74,328
DAP	59,918
Tricalcium phosphate (TSP)	40,403
Other phosphate fertilizers	31,096
Other potash fertilizers	1,438
Calcium nitrate	37
Potassium sulfate	24

## Rationale for Why Fertilizer Blended Products Were Developed

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The main rationale for blends development as it relates to fertilizers for AGRA priority crops in Mali is to mimic the NPK 15:15:15, 16:16:16 and 17:17:17 compounds. The Yara maize formulation includes S and B as well as Mg and seems to be formulated as a general cereals fertilizer that should be appropriate for sorghum and millet as well, provided that Zn is not deficient. Some of the Toguna maize blends under evaluation with IER seem to be testing the effects of various secondary and micronutrient additions, which is discussed later. Cowpea formulations are without N, which is a common strategy for legumes, as N can suppress N fixation. In relation to cowpea, however, it is not clear that this is necessary, as it usually fixes N prolifically in most circumstances. Some small amount of starter N in the basal formulation may be useful for cowpea.

## Type of Fertilizer Recommendations that are Available and Their Suitability to Staple Crops Targeted by AGRA

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Table 2 shows the fertilizer source and rate for AGRA priority crops in Mali.

### Maize recommendations and their suitability

All maize recommendations are based on 100 kg of basal formulation per ha. Given the amount of P in these formulations, this is likely inadequate for optimized yield in higher rainfall areas but may be adequate where rainfall is scarce. While some of the newer formulations have various secondary and micronutrients, all are composed of granular blends. As such, the amounts of Zn and B are not likely to be adequate; higher rates of Zn and B are required when supplied as granulars (a minimum of 1 kg Zn and 0.5 kg B/ha) when supplied as granular fertilizers. It will likely be difficult to draw conclusions regarding the compounds currently tested, since the NPK quantities change. One will not be able to ascertain if yield increase or decline is due to a change in NPK ratios or secondary and micronutrient additions.

### Sorghum recommendations and their suitability

Like maize, sorghum recommendations are based on 100 kg of basal formulation per ha. Given the amount of P in these formulations, this is likely inadequate for optimized yield in higher rainfall areas but may be adequate where rainfall is scarce. The only non-NPK nutrient in any sorghum recommendation is S, so these formulations may not be optimal, though it is difficult to know until further soils information is available and some specific response trials have been conducted.

### Cowpea and millet recommendations and their suitability

Lack of soils information makes it difficult to conclude anything regarding the suitability of cowpea and millet recommendations. The rates of P seem low, but as these crops are grown in dry areas, either risk factors or inherently low yield potential may play a role in the recommended rates.

For all crops, germplasm potential may also be limiting yields.



**Table 2. Nutrients extracted for given yield targets and nutrients supplied in recommendations for AGRA priority crops**

Crop	Yield target	Reference	Basis for formulation	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	CaO	MgO	S	Zn	B	Cu	Mn	Fe
<b>Maize</b>	Mt ha <sup>-1</sup>			-----Nutrients removed in crop and residue, kg ha <sup>-1</sup> -----										
	5			100	46	121	18	35	13	0.23	0.24			
				-----Nutrients supplied in recommendation, kg ha <sup>-1</sup> -----										
	NPK 17-17-17 4S 100 kg/ha + Urea 150 kg/ha	IER Mali	Field trials	86	17	17			4					
	NPK 17-17-17 100 kg/ha + Urea 150 kg/ha	IER Mali	Field trials	86	17	17								
	NPK 23-13-13 + 3.6S + 2.6MgO + 0.3 Zn 100 kg/ha + Urea 150 kg/ha	IER Mali	Field trials; Yara product	92	13	13		2.6	3.6	0.3				
	NPK 17-17-17 +4S +2MgO 100 kg/ha + Urea 150 kg/ha	IER –Toguna Mali	2 years Field trials	86	17	17		2	4					
	NPK 23-10-15 + 3S + 2MgO + 0.3 Zn 100 kg/ha + Urea 150 kg/ha	IER –Toguna Mali	2 years Field trials	92	10	15		2	3	0.3				
	NPK 25-12-15 +3S +1MgO +0.2B +0.2Zn 100 kg/ha + Urea 150 kg/ha	IER-Toguna Mali	2 years Field trials	94	12	15		1	3	0.2	0.2			
NPK 19-17-14 +3S +2CaO +0.4Zn 100 kg/ha + Urea 150 kg/ha	IER-Toguna Mali	2 years Field trials	88	17	14	2		3	0.4					
Urea 131 kg/ha + NPK 66 kg/ha	OFRA	Profit optimization	71	11	11									
<b>Sorghum</b>	Mt ha <sup>-1</sup>			-----Nutrients removed in crop and residue, kg ha <sup>-1</sup> -----										
	2			60	21	43	10	9	7.2	0.07	?			
				-----Nutrients supplied in recommendation, kg ha <sup>-1</sup> -----										
	NPK 17-17-17 100 kg/ha + Urea 50 kg/ha	IER Mali	Field trials	40	17	17								
	NPK 17-17-17 4S 100 kg/ha + Urea 50 kg/ha	IER Mali	Field trials	40	17	17			4					
Microdosing DAP 20-35 kg/ha	IER Mali	Field trials	4-6	9-16	0									
NPK 17-17-17 187 kg/ha	OFRA	Profit optimization	32	32	32									
<b>Cowpea</b>	Mt ha <sup>-1</sup>			-----Nutrients removed in crop and residue, kg ha <sup>-1</sup> -----										
	2			129	33	120	32	27	22	0.21	--			
				-----Nutrients supplied in recommendation, kg ha <sup>-1</sup> -----										
	Rock Phosphate 50 kg/ha NPK 0-29-0	IER Mali	Field trials	0	14	0								
	SSP 50 kg/ha NPK 0-22-0	IER Mali	Field trials	0	11	0	14		6					
NPK 0-23-15 + S+Mg+Zn+B 50 kg/ha	IER Mali	Field trials	0	11.5	7	11	?	?	?	?				
NPK 17-17-17 66 kg/ha + MOP 12 kg/ha	OFRA	Profit optimization	11	11	18									
<b>Millet</b>	Mt ha <sup>-1</sup>			-----Nutrients removed in crop and residue, kg ha <sup>-1</sup> -----										
	2			<b>Undocumented, presumed similar to sorghum</b>										
				-----Nutrients supplied in recommendation, kg ha <sup>-1</sup> -----										
	NPK 17-17-17 100 kg/ha + Urea 50 kg/ha	IER Mali	Field trials	40	17	17								
	NPK 17-17-17 4S 100 kg/ha + Urea 50 kg/ha	IER Mali	Field trials	40	17	17			4					
Microdosing DAP 20-35 kg/ha	IER Mali	Field trials	4-6	9-16	0									
Microdosing of 26 kg 17:17:17 + 10 kg of urea per ha	OFRA	Profit optimization	9	5	5									

## Gaps that Need to be Addressed to Come Up with Area and Crop Specific Blends

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Lack of soils information is a significant constraint in Mali. Systematic response trials, based on treatment choices and availability of soils information, are required to get to most efficient formulations quickly. Also required is an understanding by the blender and research community regarding the rates of nutrients, particularly micronutrients, that need to be added to induce a response, and how they can be most optimally applied from a cost perspective.

## Recommendations and Interventions that AGRA Could Implement to Address the Availability of Quality Fertilizers

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1. AGRA may have more complete knowledge of soils information than what we are able to obtain. Whatever information is available, along with results from response trials, should be gathered in consultation with IER. This can be done at a workshop. Fertilizer blenders may have some information as well. Many cotton blends have been tested and may offer some guidance regarding deficiencies that could apply to other crops.
2. Support best-bet trials on AGRA priority crops. One major objective of these trials should be to demonstrate that superior yields can be achieved at lower or equal fertilizer costs than are being realized with the current recommendations. How these treatments are structured depends on the soils information that can be gathered. Some support from IFDC will be required to ensure that rates are sufficient to be responsive. These trials also need to consider germplasm potential and rainfall-limited yield potential in determining fertilizer rates.
3. Invest in national capacity to implement balanced crop nutrition research through appropriate technical training of national soil scientists, agronomists, and private sector blenders and field staff. Advanced skills can be used to efficiently develop/validate new formulations and determine the agronomic effectiveness of different nutrients (omission trials). Solid partnerships with private sector blenders are required to share costs and maximize benefits to both sectors.

## The Malian Fertilizer Market

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The Malian Fertilizer Distribution Structure and Value Chain SWOT analysis are presented in Figures 1 and 2, respectively.

### Demand

Apparent consumption of fertilizers has more than doubled in Mali over the last 8 years and has now exceeded 700,000 MT, driven by subsidies which also led to the expansion of land under cereal cultivation. Of the total fertilizer volumes consumed, 88% are subsidized, leaving only about 80,000 MT private (unsubsidized) volumes.

A significant proportion of the private volumes are likely to end up around the subsidized areas, as farmers are likely to be more appreciative of fertilizers and can probably better afford them than farmers not receiving a subsidy allocation. Moreover, given the influence of subsidy on distribution, private fertilizers are likely to be more available in the subsidized areas.

Subsidies were re-introduced in response to the 2008 world food crisis. Since then, Mali has managed to produce surplus maize which was exported to neighboring countries.

Despite the rise in consumption, Mali's consumption per hectare, at 29 kg/ha<sup>1</sup>, though higher than West African neighbors, remains significantly lower than the world average. In some production areas, especially where cotton is grown, and where there is Government focus, the consumption per ha will be significantly more than in other areas without Government support.

Demand has grown with, and has demand been constrained by, Government support:

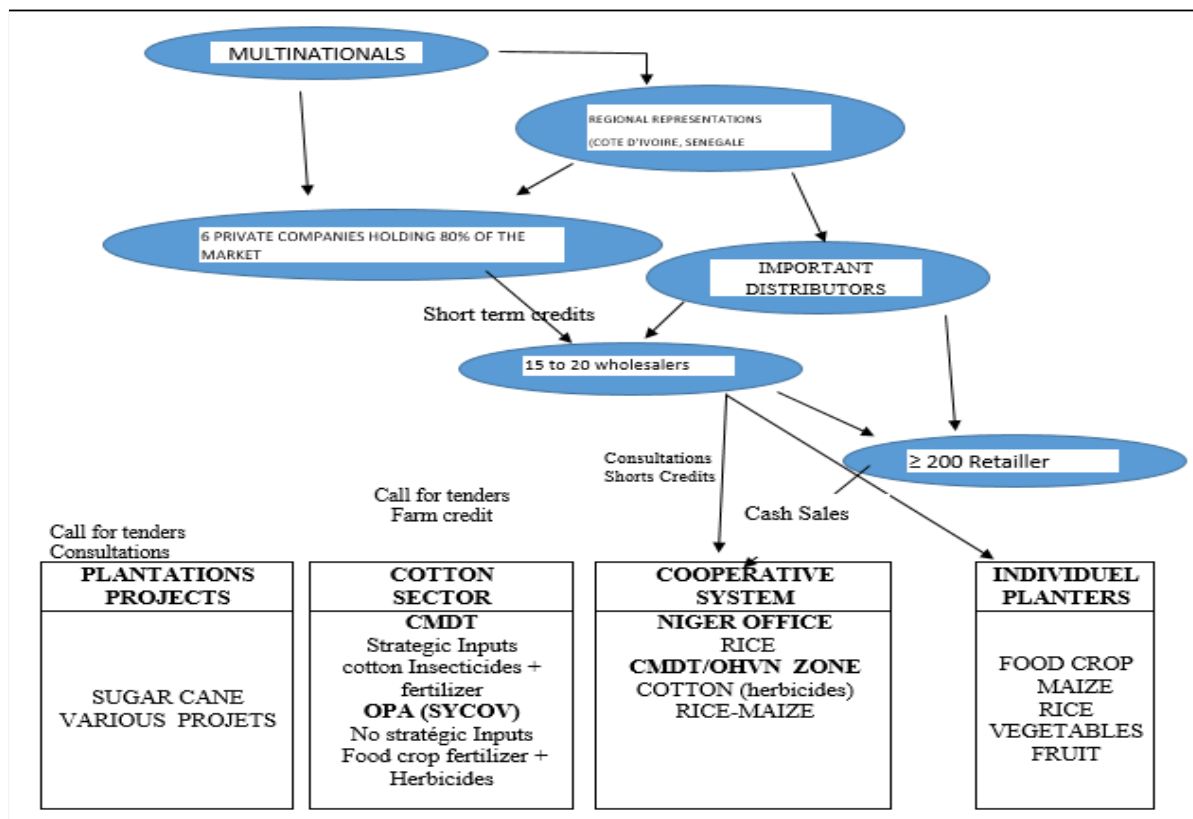
- The fertilizer systems in Mali leave the farmer with very little agency – they are mostly bulk procurement systems with subsidies and a target matrix of crops and regions.
- The cotton industry consumes the bulk of the fertilizer procured for the country, benefitting from contributing significantly to Government income.
- Products are more likely to be more available around Government structures than other areas.
- Farmer are dependent on Government budget.
- Farmer groups exist but appear to focus more on distributing the subsidized fertilizers than improving consumption.
- There is no demand-generating activity in the market beyond decisions on subsidy volumes.

The dependency of the farmer on Government subsidy and finance has contributed, to a large extent, to the low level of demand for fertilizers in Mali. Though Malian farmers are small holders, with little wherewithal and low education, their activity, and the potential of their activity, could have attracted enough private interests to catalyze growth. Unfortunately, Government has decided to keep the fertilizer sector private by representing the farmer, becoming the market. The farmer in the mainstream Malian fertilizer sector has very little agency.

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<sup>1</sup> WDI, World Bank, 2014 results.





### Apparent Consumption for Mali (mt)

					805,879
					590,655
371,985	295,459	300,474			
2013	2014	2015	2016	2017	

	Fertilizer System	Volume (mt)	%
Cotton	Bulk Anchor	450,000	57%
Rice	Bulk Plantation	50,000	6%
Sugar Cane	Bulk Anchor	5,000	1%
Direct Subsidy	Bulk Government	200,000	25%
Others	Private	80,000	10%
		785,000	

**\*700,000mt (88%) of Fertilizers were subsidized by the Government in 2017**

Figure 1. Mali fertilizer market distribution structure, apparent consumption, and volumes distributed via various distribution systems

	Strengths	Weaknesses	Opportunities	Threats
<b>Manufacturer</b>		<ul style="list-style-type: none"> <li>Government led and dependent on Government subsidies</li> </ul>	<ul style="list-style-type: none"> <li>Demand for product in neighbouring countries</li> <li>Transport cost to export could be reduced using reverse logistics</li> </ul>	<ul style="list-style-type: none"> <li>Ability and will to invest in producing at competitive pricing</li> </ul>
<b>Importer</b>	<ul style="list-style-type: none"> <li>Access to cheap finance</li> <li>Partnerships with wholesalers who also have partnerships with retailers</li> <li>Good haulage assets</li> </ul>	<ul style="list-style-type: none"> <li>Dependent mostly on Government business and other tenders – minimal recognition of the farmer as a consumer</li> </ul>	<ul style="list-style-type: none"> <li>Urea from Nigeria</li> <li>Reduced transport costs from reverse logistics</li> </ul>	<ul style="list-style-type: none"> <li>Government policy on subsidy could change</li> <li>Changing Governments could mean changing relationships</li> </ul>
<b>Blender</b>	<ul style="list-style-type: none"> <li>Access to cheap finance</li> <li>Offers credit to wholesalers</li> <li>Good haulage assets</li> </ul>	<ul style="list-style-type: none"> <li>Leadership competence</li> <li>Blending technology</li> <li>Blending management and product development</li> </ul>	<ul style="list-style-type: none"> <li>Specialty blends to improve productivity with the introduction of micro-nutrients to new crops – tomatoes, potatoes...</li> </ul>	<ul style="list-style-type: none"> <li>Competition from a multi-national (type OCP / Indorama / Yara)</li> <li>Stronger regulatory controls on product quality</li> </ul>
<b>Distributor</b>	<ul style="list-style-type: none"> <li>Agro Dealer relationship – includes credit</li> </ul>	<ul style="list-style-type: none"> <li>Disinterest in farmer growth and development</li> <li>Primarily focused on subsidy business</li> <li>Lack of distribution competence – marketing, accounting, planning ...</li> <li>Works with importer / blender credit</li> </ul>	<ul style="list-style-type: none"> <li>Latent demand of unorganised or unserved SHF</li> </ul>	<ul style="list-style-type: none"> <li>Removal of subsidies leading to a competitive environment</li> </ul>
<b>Agro Dealer</b>	<ul style="list-style-type: none"> <li>Farmer interaction / relationships</li> </ul>	<ul style="list-style-type: none"> <li>Too many small ADs (&lt;300mt/yr)</li> <li>Lack of working capital</li> <li>Growth limited to subsidy participation</li> <li>Distribution competence – marketing, accounting, planning...</li> </ul>	<ul style="list-style-type: none"> <li>Latent demand of unorganised or unserved SHF</li> <li>Development of a professional association</li> </ul>	
<b>Processor</b>	<ul style="list-style-type: none"> <li>Organised and controlled supply chain of feedstock</li> </ul>	<ul style="list-style-type: none"> <li>A monopolistic culture and incumbent inertia</li> </ul>	<ul style="list-style-type: none"> <li>Development of value added activities which will improve farmer income and company earnings</li> </ul>	<ul style="list-style-type: none"> <li>Weak farmer profitability.</li> </ul>

### Key Takeaways:

1. Supply chains are highly controlled by either Government (rice / maize / millet / sorghum) or processor (cotton / sugar cane)
2. Participants do not think about marketing, only of product movement and storage (consignment stock)
3. There is a lot of credit in the system but riding on subsidy programs
4. Unsubsidized volumes are about 10%, leaving retailers fragmented and small

**Figure 2. Value chain SWOT analysis for Mali**

## Supply

There are 5 predominant importers in Mali: Yara, Toguna, Somadeco, Sogefert, and DPA. Of the 5, 3 own blending plants - Toguna (supplies about 50% of Malian demand), SOGEFERT and DPA. Toguna also owns a phosphate mine and granulation plant.

In Mali, there are 4 companies that produce organic fertilizers: 1) Profeba at Segou; 2) Éléphant Vert at Segou; 3) Orgafert at Sanankoroba; and 4) Mali-Engrais at Bamako.

Given that 90% of demand is through bulk procurement, the supply of fertilizers has been built around relationships with procurement officials by importers and traders. Blenders therefore think more like traders than manufacturers: they do not try to understand the farmer, they do not attempt to build their brands, and they buy and sell for the Government.

For the current demand volume, there is excess supply (blending) capacity and some of the capacity is utilized to export to Burkina Faso.

To mitigate the working capital burden on the blenders, they are supported with low interest loans from the development finance bank to support the subsidy. These loans are then converted into credit and extended to wholesalers who are linked to the blenders.

Importers and blenders in Mali have invested in logistics infrastructure (trucks and warehousing) to improve the efficiency of their operations.

Like importers, distributors show little interest in farmer growth and development. They are primarily focused on the subsidy volumes that can pass through them. The link between the wholesalers and the subsidies are the blenders, so the primary client of the distributor is the blender. The competences therefore developed by the distributor to win the client (networking / relationships) are different to those required to succeed in the market place of farmers. The distributor, as is the case with the blender, controls the relationship immediately downstream (retailer) or is expected to be paid for the service of supplying to a specified destination. For the wholesaler, participation in the private market is opportunistic.

The retail landscape is littered over 2000 agro dealers distributing less than 300 MT/ year<sup>2</sup>. Most do not have the working capital required to conduct the business normally and have to rely on credit from wholesaler. The growth of the business of the agro-dealer is therefore dependent on the priority of the upstream actors and not farmer preferences. Competition for the agro dealer is therefore the maintenance of relationships with wholesalers.

### Supply summary

The Malian fertilizer sector is characterized by a supply chain that is highly controlled and influenced by either the Government (rice / maize / millet / sorghum) or the processor (cotton / sugarcane). Participants do not think about marketing but of product movement and storage (of consignment stock for the blender / importer). Credit is abundant in the system, but it is associated with either Government or processor, and the open (private) market is 10%, leaving the retailers fragmented and small.

The supply chain participants are weak technically (knowledge of products and processes) and managerially (finance and marketing).

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<sup>2</sup> A recent survey by AFAP on 60 agro dealers from 2 regions found that: 68% agro dealers sell less than 100 T/year of fertilizer, 14% of agro-dealers sell between 100 and 200 T/year and 18% sell more than 200 T/year.

## Policy contribution and outcomes

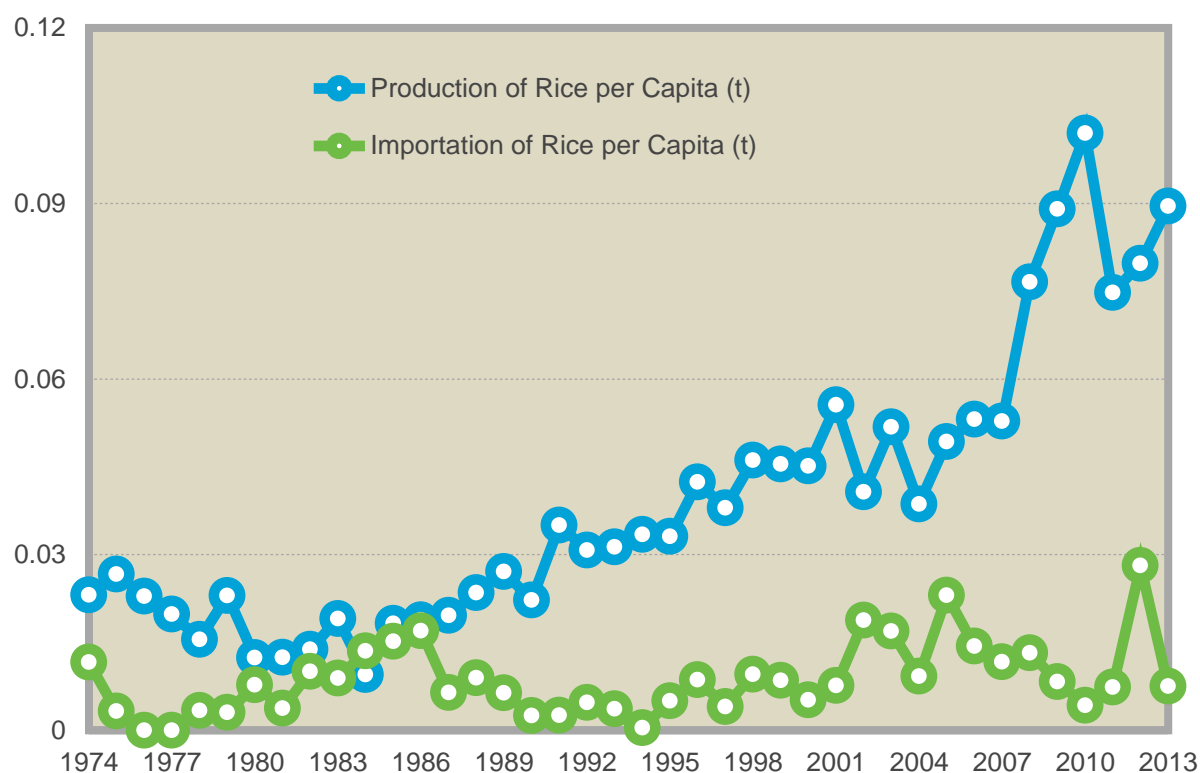
Since the 1990s, Mali's agricultural industry has shown vulnerability. In 2004, fields were decimated by locusts; 2005 and 2011 witnessed the Sahel drought which affected production negatively; the world food price crisis between 2007 and 2008 affected vulnerable people across Africa.

The occurrences triggered a determination by the Government to increase production, resulting in two major decisions:

- Increased subsidies of agricultural inputs: fertilizers, seeds, and livestock.
- A rice initiative to 100,000 ha of irrigated land along the river Niger, primarily for industrial rice production.

The decisions have led to subsidies growing to as high as 23% of government's expense (Figure 2) and production of rice per capita almost doubling (Figure 3).

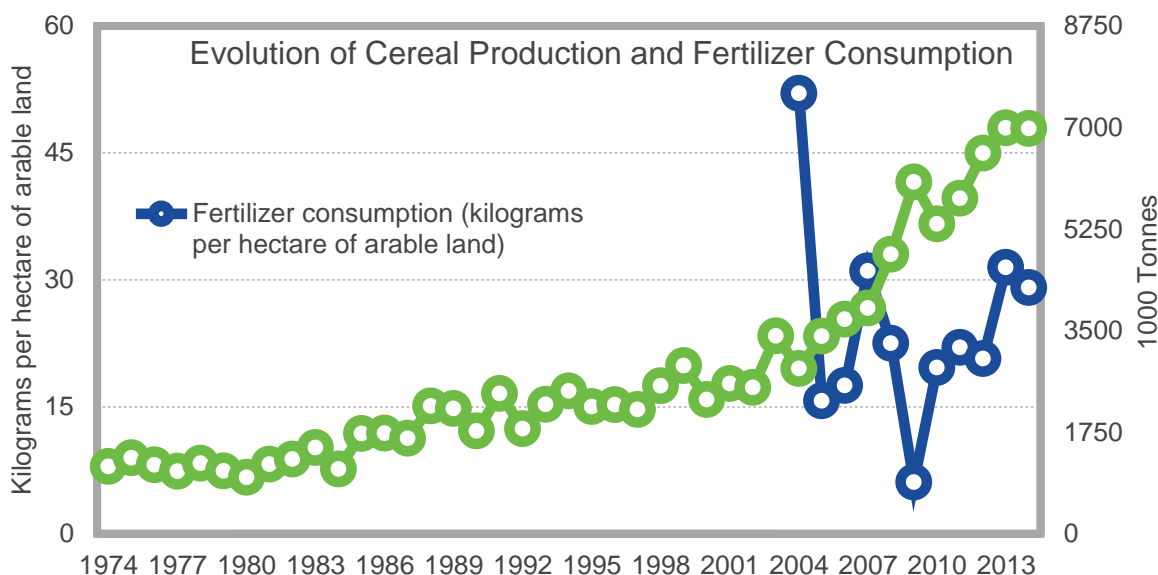
The Government supports 5 value chains with subsidies: 1) cotton, organized by the exporters and some cooperatives; 2) rice, through the Office du Niger; 3) sugarcane, managed by Sukala; 4) direct subsidies from Government to support maize, millet, sorghum and cowpea; and 5) vegetable production.



**Figure 3. Trends of per capita rice importation and production.**

Mali has witnessed consistent growth in the production of cereals, driven by significant increases in rice and maize. Cotton has also witnessed significant production increase and in 2017 overtook Burkina Faso as the largest producer in Africa (Figure 4).





**Figure 4. Cereal production and fertilizer consumption trends, Mali.**

The legal framework for fertilizer regulation exists as well as regulations guiding labeling and quality control. The fertilizer bill places the responsibility for fertilizers under a National Committee of fertilizers (CNE), which includes a representative of the Minister of agriculture and 18 other fertilizer stakeholders. Though the regulations exist, execution has proven to be very difficult; nutrients are not systematically tested and the borders are fairly porous. The regulatory body has however managed to enforce the respect of bag sizes.

## Ongoing Efforts or Investments that are Promoting the Availability of Appropriate Blended Fertilizers that AGRA Can Leverage in the Target Countries

In 2017, the 400,000 MT capacity plant of Doucouré Partenaire Agricole (DPA) was completed. Currently, another plant of about 300,000 MT annual capacity, owned by Somadeco, is being installed in Sikasso. The blending plants will compete for the bulk procurement opportunities in both Mali and Burkina Faso. Of the blending plants, only Toguna appears to be actively testing products in the field across the value chains of maize, rice, groundnuts and wheat.

## Fertilizer Companies and/or SME Blenders Existing in the Country and the Geographies Targeted by AGRA

Three blenders currently operate in Mali: Doucouré Partenaire Agricole (Ségou); Société Générale des Fertilisants (SOGOFERT; Sikasso); and Toguna Agro Industries (Bamako). Toguna also manufactures compounds based on phosphate rock Tilemsi. A fourth plant should be commissioned in Sikasso this year by Somadeco.

# Policy and Regulatory Bottlenecks that are or may Affect the Availability of Blended Fertilizers, and Interventions that AGRA and Its Partners Could Design and Advocate for Implementation to Help Farmers Access the Appropriate Blended Fertilizers

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## Supply chain constraints

The fertilizer systems in Mali are the product of bulk purchases by Government, exporters and processors. The primary clients of distribution systems are therefore the buying groups and not the farmer: the farmer was simply the end of a delivery system. From buying organizations down the distribution systems flowed products and credit, creating a pyramid of power that puts the farmer right at the bottom. The outcome is fertilizer systems that are constrained from being efficient by the following:

- There is no incentive to develop new products – when there is a decision to develop, there is no hurry to commercialize.
- Delivery systems developed to supply regions targeted by buyers, making products scarce and expensive in other places.
- Majority of blenders lack blending management expertise and are short on a farmer transformation vision.
- Distribution is immature – Supply Chain participants have more of power than commercial relationships with one another; most are managed by inadequately trained personnel.
- Despite the control of the chain by the bulk buyers, the activities of the actors are still not transparent – management information systems are either weak or non-existent.
- With only 10% of fertilizer being private, the retail network is made up of small fragmented agro dealers with a significant majority illiterate and very traditional.
- Products are expensive – Government does not pay its subsidy on time which is factored into the pricing
- Products are not adapted to crops and they are also not optimized.
- Research institutions have not been active in the development of the sector.

## Policy constraints

- The Civil Service is weak, and Government has a monopoly mindset.
- Though the fertilizer systems are centrally managed, quality control is poor – drafted regulations are poorly implemented.
- The fertilizer system is dependent on subsidy which is unsustainable at 23% of Government's expense.
- With the spend on subsidy, it is difficult for Government to support other parts of agriculture that could improve efficiency – rural roads, regulatory systems.
- The Government is complicit in a cotton system that subdues farmers – the system develops farmers as plantation workers rather than independent entrepreneurs.
- Research institutions are underfunded and probably poorly led. They do not appear to be capable of contributing to the development of the sector.

## Summary of constraints to achieving efficient fertilizer systems

Fertilizer systems are efficient when manufacturers and importers, under regulatory guidance and control, continually partner with downstream participants within the supply chain to create and exploit value from the chain by developing innovative products and by improving delivery systems.

The Malian fertiliser systems have grown to supply bulk buyers rather than to compete for farmer value. This centralization of power has been further strengthened by Government subsidies and the financial institutions – credit is supplied to the organized system with buyer guarantee. Though controlled, the systems have been left mostly unregulated in terms of products, processes and activities. With an absence of regulation, the research institutions have been unable to contribute to the improvement of the sector, and have not been equipped with material and human resources. The outcome is a scarcity of technical and managerial knowledge of fair competition across the fertilizer value chain (product determination, blending and distribution) and a lack of transparency on activities within the chain.

## AGRA Intervention Options

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Given the current culture within the fertilizer sector, the sustainability of the production and distribution of appropriate blends in Mali will depend on: 1) the improvement of the existing institutional structure – regulatory system, fertilizer competence in the country, and soil mapping; 2) strengthening of the implementation capacities of AGRA partners; 3) investing in best-bet trials and commercialization of optimized products within the AGRA geographies.

### Development of an institutional structure

#### *Regulatory system*

There has been some effort to operationalize a fertilizer regulatory system in Mali. It has however been difficult to execute. The execution difficulty is no doubt aggravated by the culture of participants in the delivery system, especially the focus on the buyer rather than the farmer.

To transform the regulatory structure, it will be necessary to create an active platform of stakeholders to work with the CNE to:

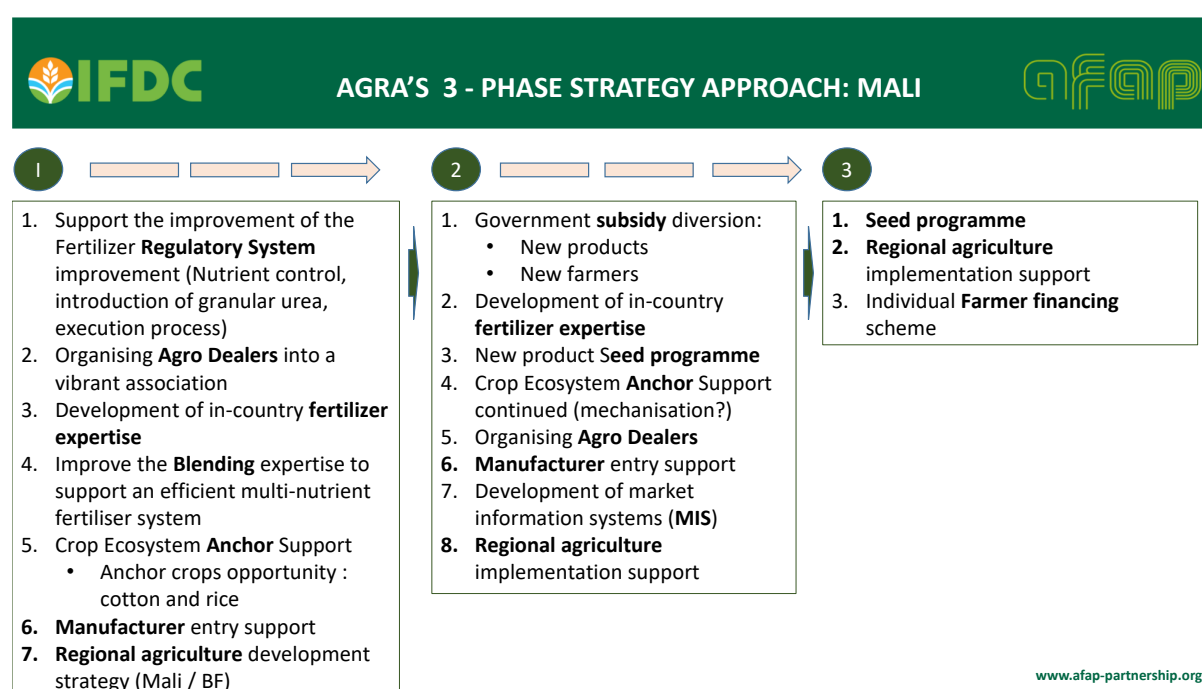
- Understand the current unregulated landscape and its negative impact on value addition.
- Develop a joint vision that is farmer-centric.
- Through a scrupulous appraisal of the current system, understand the constraints to realizing vision within the fertilizer systems.
- Agree on the key roles of the different actors.
- Develop a roadmap that takes into consideration the level of preparedness of, and the need for self-regulation by, the different actors.
- Include in the roadmap the funding of assets required for effective regulations, including lab equipment and data collection and management systems.
- Institute a review mechanism.

The development of the platform – convening, facilitating and funding – will require an external organization and will require the participation of technical resources that Mali does not have in-country. The constitution of the platform should take into consideration the need for a transformation of the regulatory system and therefore recruit members that are genuinely interested in the sector and are mavericks of their trade

## AGRA Strategic Planning

Getting good quality blends sustainably to the small holder farmer will probably require a 3-phase approach that has some immediate actions, complementary actions after the initial have gained traction and there is a structural effect, and the transition into maturity. The duration from starting to maturity is estimated to be 5 years (**Figure 5**).

Each phase has a blend of the intervention options and is dependent on the geography but the principles can be applied to multiple locations at the same time.



**Figure 5. Proposed 3-phase strategic approach for Mali**

The first phase of proposed AGRA options has two parts:

1. Development of a more effective regulatory system. This phase will entail two key parts: urgent need to create efficiency within the current system from improved products (blends and urea), and the gradual building of the institutional base for the sustainability of the sector through the development of a vibrant technical and professional environment within the system.
2. The encouragement of substantial investments into the Malian agricultural sector. These investments can come from fertilizer manufacturers as well as processors and the

investments are to improve the competitiveness<sup>3</sup> of the agricultural landscape which has been dominated by monopolies.

The **first phase** is to improve immediately the quality of products (blends and urea) while building the foundation for transparency and regulation of the fertilizer sector, leading to better distribution discipline and improved farmer yields. These institutional actions are then complemented with the improvement, with technical support and mentoring of blending management and the distribution associations. An important final part of the first phase is the development of a regional strategy that involves the investment of large manufacturers with brand consciousness in to the Malian market. These manufacturers could be new entrants or they could be existing but expanding.

More details of the first phase are:

- Implementing a nutrient control system within the quality control mechanism of the Malian regulatory system. This will require the definition of processes and procedures for sampling and testing as well as for managing the outcome of the test results.
- Development and trials of new products and practices for maize, sorghum and soya beans. The anticipation is that the implementation will be in the second phase. It is important that granular urea be included urgently too.
- A part of the nutrient control system, and the new products, is the output of the blenders. The current current blenders therefore need to be engaged early as they will need to make investments in their processes.
- Re-orienting agrodealer associations from being bulk-purchaser focused to being fertilizer distribution specialists. The associations will need to supported to professionalize the associations further, to include information gathering systems and to provide a control mechanism to guarantee the quality of the membership and the quality of the output of the agrodealers will be regulated by the Government.
- Facilitating the introduction of processors into the market. There is too little value addition to crops like maize and sorghum in Mali. They are staples, farmed for consumption. The presence of processing (to cereal, for example) starts to change the attitude to the crops; they start to become commercial crops requiring a different type of attention including the utilization of fertilizers. Moreover, given the Malian agriculture structure, the presence of a processor is accompanied with input credit which improves availability and consumption.
- The activities of the first phase across the chain provide the opportunity to build fertilizer expertise within the ecosystem. Fertilizer competences of blenders, agrodealers (and associations) and public institutions could be upgraded.

In addition to continuing the programs begun in the first phase, the **second phase** starts to demand changes of the principal supply chain actors and Government. In this phase, for example, the products trialed in the first phase will be introduced on the back of the subsidy regimes. The cotton sector, for example, could be the partner for the products given that some of the cotton farmers also produce maize and sorghum. In addition, soya beans can be targeted through Government subsidies directly. The subsidies could be developed to go through an

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<sup>3</sup> A 10% increase in competition could increase fertilizer use by 13–19% and rural incomes by 1–2% in regions like sub-Saharan Africa (Maximo Torero, 2013).

association of retailers into the soya areas. The subsidy program should be an intervention – 2 years – to link the private sector to the farmers. It should be developed to take into consideration the affordability of the product and to create awareness about the private sector of the input potential in the area. AGRA could also incorporate seed programs into this phase.

The proximity and similarity of Mali and Burkina Faso should provide an opportunity for some Regional agriculture. For example, the production of cotton, between 1.2 and 1.4 MT should attract textile manufacturing. The lack of value addition in cotton cripples the farmer. The facilitation of a regional outlook is therefore recommended in the second phase.

All the activities of the first phase would have included data gathering systems the improvement of which will be a focus of this stage of interventions. The availability of information improves the transparency and the willingness of investors and financial institutions to participate in the ecosystem; harnessing the information enables better decision making by the actors.

Most activities would be maturing, and the landscape significantly modified, by the **3rd phase** of options. Fertilizer systems will be significantly more transparent from the importer/manufacturer to the farmer. Farmer yields should have shown significant increases and the value chain should have benefitted from the increase. The anticipation is also that Government subsidies would have reduced significantly so as not to be of any serious consequence to the sector. With increased productivity and credit support both upstream and downstream, the farmer is motivated to want to grow his/her business. The most important activity AGRA can therefore focus on then will be direct farmer financing.

## Appendix I. Potential Partners and Key Country Contacts in Mali

Location	Organization and Contact Details of Key Personnel	Organization Type	Brief Description of Activities as Related to AGRA Priority Crops
BAMAKO	<b>Ministère de l'Agriculture</b> <b>1) Lassina Dembélé Secrétaire Général</b> Tel +223 76 07 00 75 <b>2) Dramane Sanogo</b> Conseiller Technique au MA Tel +223 77 97 85 86	Service public	1) Elaboration et mise en œuvre de la politique du Gouvernement dans le domaine de l'Agriculture et de la sécurité alimentaire; 2) Chargé du suivi des dossiers relatifs aux filières et aux intrants agricoles
BAMAKO	<b>Institut d'Economie Rurale (IER)</b> <b>1) Abdoulaye Hamadoun</b> Tel +223 66 72 54 09 Directeur Général <b>2) Mama Koné</b> Chercheur au Laboratoire Sol Eau Plantes  Tel +223 66 80 32 91	Service public	1) Recherche sur les nouvelles variétés et technologies pour l'amélioration de la productivité agricole et création de semences de pré-base et de base pour les mil-sorgho, Maïs, riz, niébé, arachide, fonio et sesame dans les stations et sous station. 2) Evaluation de l'efficacité agronomique de nouvelles formules 'engrais; 3) Analyse des sols
BAMAKO	<b>Direction Nationale de l'Agriculture (DNA)</b> <b>1) Oumar Fofana</b> Tel +223 79 40 20 64 Email: fofanaoumar45@yahoo.fr Chef de Division, chargé des filières agricoles et vulgarisation <b>2) Alou Niangado</b> Chef de section cultures sèches/irriguées Tel +223 66 81 82 98 <b>3 Moussa Sidibé</b> Chef de section statistique Tel +223 76 42 57 05 Email: sidibemoussad@yahoo.fr	Service public	1) Elaboration et mise en œuvre de la politique nationale de développement agricole et de la sécurité alimentaire; 2) Mise en œuvre de la politique d'équipement des producteurs et de subvention des intrants agricoles
BAMAKO	<b>Cellule de Planification et de Statistique du secteur Développement Rural (CPS-SDR)</b> <b>1 Moussa Camara</b> Directeur Général Tel +223 76 47 43 48 <b>2 Hawa Sow</b> Point focal CountryStat Tel +223 66 85 24 05	Service public	1) Elaboration et bilan des campagnes de production du secteur Développement Rural 2) Mise en œuvre et bilan des enquêtes agricoles de conjoncture 3) Suivi-Evaluation des programmes du secteur Développement Rural



Location	Organization and Contact Details of Key Personnel	Organization Type	Brief Description of Activities as Related to AGRA Priority Crops
BAMA KO	<b>Assemblée Permanente des Chambres d'Agriculture du Mali (APCAM)</b> <b>1) Bakary Togola Président</b> Tel +223 20 21 87 25 <b>2) Abdoulaye Kéita</b> Conseiller Technique Tel +223 76 42 97 72	Organisation professionnelle paysanne	1) Organisation des producteurs par filières et par région; 2) Plaidoyer pour défendre les intérêts des producteurs auprès des pouvoirs publics
BAMA KO	<b>Banque Nationale de Développement Agricole (BNDA)</b> <b>1) Souleymane Waigalo</b> Directeur Général Tel (+223 66 75 32 64 Email: swaigalo@bndamali.com <b>2) Lassine Coulibaly</b> Directeur Commercial Adjt Tel +223 66 72 40 40	Secteur Para Publique	1) Financement en amont des mélangeurs et importateurs d'intrants agricoles 2) Financement et octroi en aval des crédits agricoles aux producteurs
BAMA KO	<b>Centre International pour le Développement des Engrais (IFDC)</b> <b>1) Amadou Ouadidjé</b> Représentant Pays Mali Tel +223 76 23 40 42 Email: <b>2) Doua Demba Diallo</b> Coordinateur Projet ENGRAIS Tel +223 76 40 39 66 Email:	Service Public	1) Fournir aux acteurs du développement rural des informations sur la production, la consommation, la commercialisation et le système de distribution des engrais; 2) Expérimenter en rapport avec les structures de recherches de nouvelles technologies pour une plus grande profitabilité des engrais
SEGOU	<b>Office du Niger (ON)</b> <b>1) Bamoye Kéita</b> Directeur Appui au monde Rural Tel +223 76 20 70 03 <b>2) Fousseyni Konaté</b> Chef service Promotion monde Rural Tel +223 66 81 52 57 <b>3) Youssef Coulibalay</b> Chef Division Intrants Tel +223 76 20 82 15	Service Public	1) Développer la culture irriguée du riz et autres cultures; 2) Contribuer à la sécurité alimentaire du Pays
SEGOU	<b>Complexe Sucrier du Kala Supérieur (SUKALA-SA)</b> <b>1) Bouraïma Traoré</b> Directeur Technique et de Production Tel +223 73 29 28 98 <b>2) Katié Coulibaly</b> Directeur Technique et de Production Adjt Tel +223 73 29 33 81	Service Public	1) Développer la culture industrielle de la canne à sucre; 2) Développer la production nationale de sucre et produits dérivés de la canne à sucre



Location	Organization and Contact Details of Key Personnel	Organization Type	Brief Description of Activities as Related to AGRA Priority Crops
BAMAKO	<b>Sangoye SA</b> <b>Moussa Diabaté</b> PDG de Sangoye SA Président de Wafa Tel +223 66 75 30 14 Email: moussapind@hotmail.fr	Privé	1) Importer et vendre au Mali et dans la région Ouest africaine les engrais 2) Représenter les fabricants, importateurs et distributeurs d'engrais de l'Afrique de l'Ouest à tous les niveaux.
BAMAKO	<b>Toguna Agro-Industries</b> <b>Oumar Guindo</b> Ditecteur Général Tel +223 66 74 00 60 Email: omguindo@groupeoguna.com	Privé	Produire et commercialiser les engrais mélanges au Mali et dans la région Afrique de l'Ouest
BAMAKO	<b>Doucouré Partenaire Agricole (DPA)</b> <b>Fatoumata Binta Doucouré</b> Directrice financière +223 66 16 80 17 fdoucoure@dpa-industries.com, fasodjigui@gmail.com	Privé	Produire et commercialiser les engrais mélanges au Mali et dans la région Afrique de l'Ouest
BAMAKO	<b>SOGEFERT</b> <b>Ousmane Sidibé</b> Président Directeur Général +223 76 40 31 15 ousmane.sibide@gmail.com	Privé	Produire et commercialiser les engrais mélanges au Mali et dans la région Afrique de l'Ouest
BAMAKO	<b>Société Africaine de Distribution (SAD)</b> <b>Youssef Coulibaly</b> Directeur Général +223 76 25 60 83 <a href="mailto:dgsad@orangemali.net">dgsad@orangemali.net</a>	Privé	Commercialiser les intrants agricoles (semence, engrais, équipements) au Mali et ailleurs
BAMAKO	<b>Union Nationale des Revendeurs d'Intrants Agricoles (UNRIA)</b> <b>Ousmane Théra</b> Président UNRIA +223 66 81 55 55 Email: oussouthera@yahoo.fr <b>Cheick Hamala Camara</b> Revendeur d'intrants Agricoles +223 75 05 28 87 <a href="mailto:camarasemence@gmail.com">camarasemence@gmail.com</a>	Organisation professionnelle	Vendre en détail les intrants agricoles sur le marché local
BAMAKO	<b>Interprofession Maïs au Mali</b> <b>Bakary Doumbia</b> Président Inter profession Maïs +223 66 54 26 06	Organisation professionnelle	Mieux organiser la filière Maïs au Mali et augmenter sa rentabilité
SIKASSO	<b>Société Africaine de Distribution</b> Ousmane Sidibe CEO +223 76 40 31 15 <a href="mailto:ousmane.sidibe@gmail.com">ousmane.sidibe@gmail.com</a>	Privé	Produire et commercialiser les engrais mélanges au Mali et dans la région Afrique de l'Ouest

Location	Organization and Contact Details of Key Personnel	Organization Type	Brief Description of Activities as Related to AGRA Priority Crops
TILEMSI	<b>Toguna Agro-Industries</b> Oumar Guindo Director General +223 66 74 00 60 +223 20 20 30 81/85 <a href="mailto:omguindo@groupetoguna.com">omguindo@groupetoguna.com</a>	Privé	Produire et commercialiser le phosphate Naturel de Tilemsi au Mali et dans la région Afrique de l'Ouest