Regional Seminar on the Development of Cereal Commodity Chains in West Africa

Production Basin Dynamics, Cereal Farm Economics, and Production System Intensification

Thematic Paper No. 1 - Summary

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Regional Cereal Production Kept Up with the Growth in Demand

1. West African cereal production is currently at a volume of between fifty-two and fifty-six million tons, all cereals combined. It has grown rapidly—by 4.6% per year over the 1980-2008 period, slightly faster than population growth.

2. Regional production is negligible in global production: less than 3%. More than half of the regional production consists of millet and sorghum (57%), which are products qualified as "non-tradable" on the international market, unlike maize and rice whose shares of regional production are respectively 25% and 18%.

3. The regional dependence on imports to cover its cereal demand was stable in volume from 1980 to 2008, at around 21%-23%. However, imports rose by eight million tons over the period, and their monetary cost now amounts to 3.383 billion dollars, or 1,690 billion CFA francs. These imports mostly consist of rice (49%) and wheat and wheat flour (37%).

4. Cereal production is dominated by four countries who produce 80% of the regional supply: Nigeria tops the list (55% of cereal produced in the region), followed by Niger and Mali (8.3% each) and then Burkina Faso (7.1%). This corresponds roughly to the food system which is cereal-based in Sahelian countries, and split between tubers and cereals in coastal countries.

5. The amount of land devoted to cereal cropping is considerable. Nearly forty-five million hectares are devoted to it each year—nearly half of cultivated land. This percentage is on the order of 60% to 70% in landlocked Sahelian countries.

6. Average yields are low and have increased only slightly: all cereals combined, they rose from 0.9 to 1.2 tons per hectare over the period. Consequently, the rise in production is above all the result of an increase in cultivated land.

7. In sum, from 1980 to 2008:

    a. cereal production increased by a factor of 3.1;

    b. cultivated land increased by a factor of 2.4; and

    c. yields increased by a factor of 1.32.

Table 1: Evolution in Production, Surface Area and Yields in West Africa

	Years	Fonio	Maize	Millet	Paddy Rice	Sorghum	Dry Cereals	All Cereals
Surface Area (ha)	1980-81	213,889	2,299,949	8,251,130	2,310,001	5,719,688	14,184,706	18,794,655
	1990-91	288,194	7,736,660	12,883,494	3,517,629	9,980,672	23,152,360	34,406,648
	2007-08	430,089	7,908,098	16,049,252	5,661,726	14,435,090	30,914,430	44,484,254
	Evolution 2008/1980	**101%**	**244%**	**95%**	**145%**	**152%**	**118%**	**137%**
Production (T)	1980-81	158,112	2,246,830	5,631,811	3,343,361	5,359,435	11,149,358	16,775,498
	1990-91	180,952	8,502,382	8,838,648	5,898,843	7,430,941	16,450,541	30,927,130
	2007-08	432,524	13,276,861	15,387,486	9,442,853	13,886,906	29,706,915	52,505,933
	Evolution 2008/1980	**174%**	**491%**	**173%**	**182%**	**159%**	**166%**	**213%**
Yield (kg/ha)	1980-81	739	977	683	1,447	937	786	893
	1990-91	628	1,099	686	1,677	745	711	899
	2007-08	1,006	1,679	959	1,668	962	961	1,180
	Evolution 2008/1980	**36%**	**72%**	**40%**	**15%**	**3%**	**22%**	**32%**

8. In reality, the growth in production over the period is very unequal across countries and above all depending on type of cereal:

a. Maize production and yields have risen spectacularly, notably thanks to its development as a diversification crop in Sudanian cotton-producing zones.

b. Rice yields are stagnating despite efforts to control technical itineraries, the use of inputs and variety improvement. The tripling of production can almost entirely be imputed to the expansion of irrigation schemes in Nigeria and Mali, and to the development of lowlands.

c. Dry cereal (millet, sorghum, fonio) yields have progressed in a limited fashion for millet and fonio (35% to 40%) and not at all for sorghum. The rise in production is above all linked to the increase in surface area. The yields of these crops "suited" to drier zones are more fluctuating because they depend heavily on rainfall.

Slight Intensification but Production Systems Undergoing Deep-Reaching Changes

9. Cereal crops (with the exception of rice) have been the most neglected in agricultural policies and intensification programmes. Dry cereals—millet and sorghum—take up the most land (70% on average, more than 80% in landlocked Sahelian countries), are strategic for the food security and living conditions of rural households, and are decisive in the development of Sahelian zones. Yet, they have received the least attention from governments and regional institutions.

10. *Irrigated rice* receives significant amounts of fertilizer (100 to 300 kg/ha of urea and phosphates). But input supply systems are still fragile and not sufficiently widespread. The small amount of marketable surplus left over after self-consumption stores have been taken limits the possibilities to secure credit for producers. The problems of maintenance of developments (cost, organization and responsibility) and of (technical and organizational) irrigation control weigh heavily on technical and economic performances.

11. *Maize* benefits from its insertion in a cropping system historically based on cotton. Located in areas with high agronomic potential, maize has been able to take advantage of: (i) investments in farm equipment and draft animal power; (ii) the after-effects of the manure spread on the "lead crop in the rotation", cotton, and the extensive development of stock farming enabling fertility transfers to bush plots, and consequently authorizing the drastic reduction in fallow lands and the shift to permanent crops without affecting soil quality; (iii) the support-advice system set up for cotton; and (iv) the input credit system secured with the sale of cotton. The cotton crisis pushed maize's status from that of "pre-harvest crop" to that of "cash crop." In function of anticipated prices, farmers arbitrate the amount of land allocated to cotton and maize. In recent years, rising cereal prices have encouraged them to favour maize, or sorghum—less demanding but less productive—when access to inputs is limited (cotton company crisis).

12. *The millet and sorghum production zones* are the areas most sensitive to weather hazards and where monetization is lowest. Millet and sorghum are above all crops destined for self-consumption. They are little marketed, and a majority of farmers are both mainly cereal producers and net buyers, because their production is insufficient to cover household needs. The small share of produced cereals marketed and the variability of crops fuel market instability that, itself, works against intensification efforts.

13. The combination of (i) the lack of sustainable input access systems, (ii) high risk for yields, for which the climate is the primary limiting factor, (iii) price instability, and (iv) the low availability of improved varieties and high-performing technical itineraries leads farmers to minimize risks by not seeking to intensify. They prefer to use the labour available in the winter to increase cultivated land, often on distant and marginal (poorly productive) land, and often to the detriment of passages. The reduction—or even disappearance (see Niger's agricultural zone)—of fallow land without alternatives to ensure the renewal of soil fertility leads to "fertility drop" phenomena and places these zones in a situation of potential or real ecological crisis.

14. The use of chemical fertilizer is marginal, and intensification efforts focus primarily on fertility restoration and preservation actions: anti-erosion developments, organic manure, agriculture/stock farming/forestry balance, cereal-legume association, etc. as well as on the use of new varieties better suited to climate change (early varieties, more resistant to drought).

Competitiveness Difficult to Measure and Heavily Conditioned by the Price of Imported Cereal

15. The competitiveness of cereal-growing systems is tricky to measure. There are few data on production costs in the various farming systems. Cereals are integrated in cropping systems that are often complex on the agronomic level and in regard to their management: use and allocation of labour and equipment, after-effects of mineral and organic inputs, associated crops, etc.

16. The available data are above all on rice and maize. Few data are available on millet and sorghum crops in non-commercial production zones. The table below summarizes a few

examples of production costs and net margins per hectare in different contexts (data not comparable: different calculation methods and baseline years).

Table 2: Production Costs in Various Rice and Maize Production Basins

Production Basin – Country	Cereal	Production Costs (CFA francs)		Net Margin (CFA francs/ha)	Source and Year
		Per Hectare	Per Kg		
Koutiala – Mali	millet	24,484	29		FARM/Diarra (2008)
Koutiala – Mali	sorghum	8,802	10		FARM/Diarra (2008)
Ngaay Meckhé – Senegal	millet	37,640	50		FARM/Diarra (2008)
Cotton Zone – Burkina Faso	maize	114,400	57	31,600	OXFAM / Lannaya Consult (2008)
Irrigated Rice - Burkina Faso (large pumped-water irrigation schemes)	paddy rice	176,456	70	77,145	OXFAM / Lannaya Consult (2008)
Irrigated Rice - Burkina Faso (large diversion irrigation schemes)	paddy rice	181,687	33	451,000	OXFAM / Lannaya Consult (2008)
Office du Niger – Mali	paddy rice	355,000	84		AFD/ Baris *et al.* (2005)
Office du Niger – Mali	paddy rice	351,245	87		FARM/Diarra (2008)
Niger (AHA)	paddy rice	423,722	84	244,600	FAO / REDES (2006)
Niger (private modern irrigation system)	paddy rice	406,079	70	367,582	FAO / REDES (2006)
Senegal River Valley – Senegal	paddy rice	385,505	77		FARM/Diarra (2008)

17. These data show that the cereals produced in the region generate relatively variable margins depending on the cropping system and its technical performances. However, the data cannot be compared to each other because they do not rely on equivalent methodologies, notably in regard to the inclusion of household labour.

18. These margins are strongly affected by the sale price of the cereal grown and, ultimately, by the performance of the local cereal commodity chain. In the case of rice—and the increases in production following the price hike in 2008 attest to this—profit margins are generated by paddy prices of more than 100 CFA francs. The consumer prices of imported and local rice seen since 2008 enable very interesting margins for farmers. However, if the price falls below 100 CFA francs per kilogram for producers, most production systems show deficits. Given the level of expenses incurred, it is clear that prices are decisive in producers' behaviours.

19. A 10% drop in sale price causes lost revenue of fifty to sixty thousand CFA francs, whereas a 10% drop in fertilizer prices (via subsidies, for instance) only generates an improvement of ten to twelve thousand CFA francs in the margin. Inputs therefore need to be subsidized at the rate of 50% to "offset" a 10% drop in the sale price of paddy.

20. In the maize system, the margins calculated based on average yields (2 T/ha) are smaller than for rice. But, in the same way, and beyond production cost control, profitability for producers will depend on (i) the yield, and (ii) product valuation (sale price). One sees that in intensified production the margin is low if the products are sold at harvest. However, storage then sale in the pre-harvest period makes it possible to greatly improve the product's valuation and the margins made by producers.

21. A 10% reduction in fertilizer prices leads to an increase in margin of 4,500 CFA francs per hectare whereas a 10% increase in the sale price of maize generates an increase of 10,000 CFA francs.

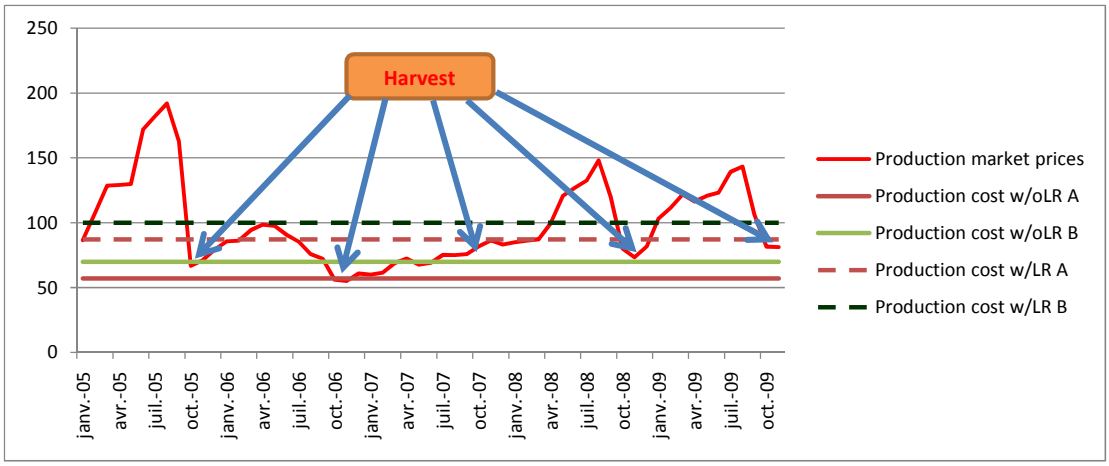
22. The following graph was established using 2007 production cost data (w/oLR A = production cost not counting the cost of labour) during the price hike (Konaté s./Oxfam). It shows that:

a. Market prices make it possible to remunerate labour when they are greater than eighty-seven CFA francs per kilogram. These prices were obtained on the market only during the 2005 pre-harvest period, following the regional food crisis, and then in 2008 and 2009 following the international price crisis.

b. Even in 2008, prices at harvest do not make it possible to remunerate labour because of the seasonal drop in prices linked to good harvests.

c. In 2006 and 2007, prices during the pre-harvest period did not make it possible to properly cover production costs and, even less, remunerate labour.

Figure 1: Impact of Production Price on the Coverage of Production Costs and the Remuneration of Labour – The Case of Maize in Burkina Faso (Solenzo market, according to MIS data)



Key: w/LR: with labour remuneration; w/oLR: without labour remuneration; A: 2007 production costs; B: idem + 22%

23. This graph highlights the role that price instability plays in seriously hindering investment and intensification. The risk for farmers is all the higher as production costs increase with the heightened use of inputs or their cost. Risk minimization strategies will, thus, be favoured in an uncertain context. Finally, the graph shows that controlling marketing (storage, delayed marketing, price negotiation) lowers market risk and improves farmers' remuneration.

Considerable Challenges for the Next Quarter Century

24. The regional cereal demand should double by 2030-2035 and reach 125 million tons based on current consumption, mainly because of population growth. It may be even higher because of: (i) the transformation of cereal into animal feed, the scale of which will depend on the evolution of the population's purchasing power; and (ii) the development of other uses for cereal, in particular agrofuels.

25. The supply growth model (expansion of cultivated land) that has prevailed for the past twenty-five years cannot be reproduced because of land pressure, ecological degradation, and the pauperization of farm labour that it generates (massive use of poorly paid manual labour).

26. Global market prospects are uncertain. The growth of Asian and African demand, the energy demand, conflicts over land use, etc. lead one to think that the markets could be tenser and especially more unstable than during the 1980-2006 period.

27. Consequently, the region must manage to intensify its cereal production systems in order to reduce its outside dependency, attain its goal of food sovereignty, and preserve its agronomic potential and its natural resource capital (land and water). Although demand favours maize and rice, the region should not forget that sorghum and millet will remain strategic cereals for food regimes and, given production opportunities, for a majority of poor smallholder farmers in dry zones and areas heavily subject to weather hazards.

28. If yields are not improved and the dependency on imports holds steady at the current rate (22%), the amount of land devoted to growing cereal will need to be doubled in 2030, from forty-five to ninety million hectares. Otherwise, average yields will need to be improved from 1.2 T/ha to 2.2 T/Ha to meet the needs without increasing the amount of land used—an improvement in average per hectare productivity of more than 80%. If the target is to maintain rice imports at the current level while wheat imports, more difficult to lower, follow the previous pace, the current average paddy rice yield will need to be multiplied by five (8.4 T/Ha).

29. With the triple aim of (i) food security and sovereignty, (ii) economic development and (iii) the promotion of socially and ecologically sustainable smallholder farming, the region must envisage intensifying the various production systems for dry cereals, maize and rice. This intensification does not follow the same technical itineraries in function of farm structure and agro-ecological context. Consequently, the government authorities and institutions must

work with FOs on the suitable responses in the various contexts. Research and development is called upon heavily but will not be able to progress without reforming its modalities for working with communities of farmers (participatory research, action-research).

30. The instability of international prices, if it carries over into the regional market and amplifies its already very high instability, works against intensification strategies. Production support instruments (seasonal financing, access to inputs and equipment, etc.) will only have full effect on three conditions:

a. if considerable efforts are made in regulating the domestic and regional markets and in controlling price instability for imported products so as to secure farmers' economic investments;

b. if sustainable institutional systems, controlled by farmers and their organizations, are set up in a contractual framework with government and banks, or even input distributors and cereal sector operators, to ensure the financing and modernization of farming systems (seasonal credit, equipment loans, commercialization loans); and

c. if policies and policy instruments manage to reach a large majority of farmers and not only a minority of farmers able to seize the opportunities offered by development projects. This massive transformation of regional cereal growing is the true challenge.

31. Reviving production to meet regional demand by relying on West Africa's potential requires simultaneous, coherent and coordinated mastery of:

a. *technical challenges,* which brings into question research and the links between researchers and users;

b. *organizational challenges,* notably as regards the wider bankarization of the cereal sector;

c. *economic challenges,* insomuch as production cost control is the key to ensuring lasting consumer preference for local products over imported products;

d. *trade challenges,* as intensification must be secured by a market that operates better, and is more predictable and better paying; and

e. *governance challenges* insomuch as cereal cropping can only be rolled out in a strongly integrated regional context. Consequently, this requires strong coordination of policies and interventions between the local level, government and cooperation institutions, and regional integration.

Reconsider Agricultural and Trade Policies

32. In the 1960s, the policies targeting cereal production focused above all on hydro-agricultural developments for rice (notably in Mali, Senegal and Niger). Supervision and support concentrated on cash crops. The administered price policy was never truly applied. The support also focused on setting up cooperatives and producers' groups.

33. The phase of government withdrawal from production in the 1980s and 1990s took the form of (i) the near elimination of subsidies, (ii) the regression of investment in agricultural developments or their renovation; (iii) the dismantling of extension and advice services, (iv) the weakening of research capacities; and (v) banks' withdrawal from agricultural sector financing, deemed "too risky."

34. Producers adapted their production systems in response to the changes in the context (increasing scarcity and degradation of land, rural population growth, rising pressure from imports, expensiveness of inputs, etc.) and in function of opportunities, without being able to count on subsidy or incentive policies from the government authorities.

35. The 2004-2005 food crisis in Niger then in other Sahelian countries showed the worsening of living conditions for a very large percentage of rural households mainly producing food for self-consumption, notably in areas with high population density where extensive technical systems were unable to intensify because the context was not conducive and farmers lacked investment capacities. The responses to this food crisis, however, did not truly address this structural dimension of the agricultural and environmental crisis.

36. It took until the international price crisis of 2008 for the debate to be re-centred on food. The government authorities took a range of measures to revive production focusing on input (fertilizer and seeds) distribution and subsidies, and on renovating irrigation schemes.

37. Analysis of these responses reveals:

a. a vision of agricultural development issues reduced to technical aspects, whereas producers must take into account many more factors in their decisions (availability of land and labour, access to equipment, market situation, etc.); and

b. a concentration of support on rice and, secondarily, maize. This is in line with the evolution of regional demand, but leaves aside a majority of dry cereal producers who, in addition, are the poorest and most vulnerable.

c. Public interventions (input distribution) took little into account the existing efforts and capacities of farmers' organizations. They favoured administrative approaches, relying on the decentralized levels of the agricultural administration. Yet, the sustainable improvement of production conditions raises the issue of the capacity to set up sustainable systems to finance production (seasonal credit) and marketing that, obligatorily, must rely on structuring farmers and signing contracts with other institutions such as banks, decentralized finance systems, etc.

d. The approach not only favours the "production dimension" alone, but also relies on the technical package of the first-generation green revolution, whose environmental and social impacts are now well known. Soil fragility and water scarcity (even if the region has considerable resources), the need to lessen smallholder farms' vulnerability by ensuring the diversification of production systems, and finally the need to cut production costs to lower consumer prices and be competitive in comparison to imported products—all these factors advocate in favour of promoting forms of agriculture that ensure the preservation and renewal of natural resources,

and high remuneration levels for labour. The efforts in this direction are above all undertaken by farmers, with the support of NGOs, but with a degree of ignorance of public policies.

e. Farmers' commercial environment is generally absent in public strategies. It was in this way that governments simultaneously facilitated rice and wheat imports, by lowering fiscal costs. Similarly, they were very hesitant to shore up border protection on cereal products, and few governments invested in forms of food product market regulation beyond the establishment of intervention stores and (contested) measures to intervene in market operation (sale at moderate prices, export bans).

38. The food crisis made it possible to increase the credibility of the regional agricultural policy defined with actors by ECOWAS (ECOWAP/CAADP) in 2005. This policy is based on modernizing smallholder farms and aims to promote food sovereignty in the region. Its roll out relies on national investment plans (NAIPs) and regional investment programmes (RIPs).

39. The countries have defined commodity chains to revive food crops that generally cover the main crops in each country.

40. The region structured its programme around three challenges: (i) the promotion of strategic products for food sovereignty (rice and maize for cereals); (ii) the promotion of an overall environment that is conducive to regional agricultural development; and (iii) access to food for vulnerable populations.

41. In this framework, the region is envisaging a range of interventions. In particular, one should emphasize:

a. farm modernization support through (i) a fertilizer subsidy co-financing programme; (ii) an equipment subsidy co-financing programme; and (iii) the promotion of seed research;

b. improving irrigation and shared water resource management;

c. the scaling up of research on adaptation to climate change, the dissemination of adaptation techniques, and the establishment of production insurance mechanisms;

d. commodity chain structuring and regional market regulation, through domestic storage mechanisms and the strengthening of the trade policy at the borders of the regional market; and

e. the development of information systems and capacity building for farmers' organizations.

42. The regional programme and the national plans offer real opportunities. However, FOs must manage to force their effective implementation in the short term. The production support measures and instruments are widely accepted enough to obtain the support of governments and donors. However, the latter are often little inclined to support market regulation instruments although we know that they are a vital condition for the positive inclusion of small farmers in the market, and one of the levers for sustainable intensification.

Beyond advocacy, FOs are directly concerned by the elaboration of these instruments and their application. Only they can defend a coherent approach and multi-format support for small farmers, who can launch a process of transforming smallholder farms and ensure their viability.