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SUBSTITUTING FOR RICE IMPORTS IN GHANA

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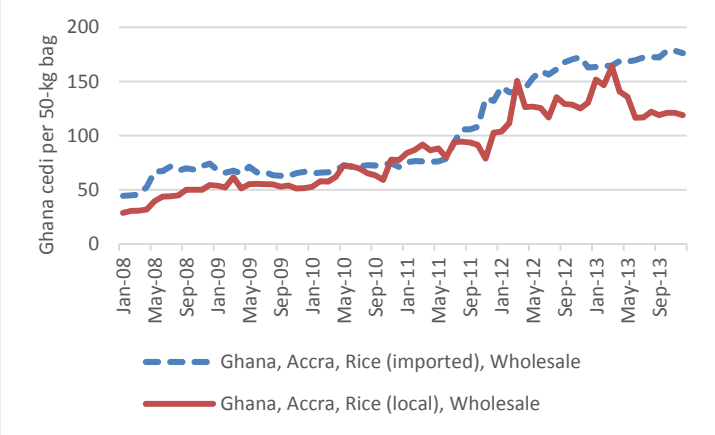
GROWING DEMAND FOR RICE

As rice imports surge ahead of production in Ghana, increasing rice production and yields has become a priority. Annual per capita consumption of rice in Ghana grew from 17.5 kg during 1999–2001 to 24 kg during 2010–2011. President Mahama, concerned with rising importation costs, suggested that rice should be produced locally (Asare-Boadu & Syme 2014). As only 5 percent of global production is traded, local production would also protect consumers from price shocks in the world rice market (World Bank 2013). While substantial investments in national rice production have been made, local production is still not able to keep up with growing demand for rice in Ghana. Although local production of milled rice recently has grown by 10.5 percent annually, from 242,000 metric tons (mt) in 2004 to 481,000 mt in 2012, most of this growth in production has come from area expansion (7.5 percent), with the remaining 3.0 percent coming from productivity improvements. Despite these efforts, Ghana imported 640,000 mt of rice in 2013.

LOCAL RICE COULD COMPETE WITH IMPORTS

Import levies and other taxes that add up to almost 40 percent of the price of rice imports protect domestic producers. In 2013, the average wholesale price in Accra markets of imported rice was ¢170 per 50 kg, while the average wholesale price of local rice was ¢131 per 50 kg, a price premium for imported rice of about 30 percent. The price of imported rice generally has stayed above the wholesale price of local rice in Accra between 2008 and 2013 (Figure 1).

Figure 1 Comparison of wholesale prices of imported and local milled rice (2008-2013)



Source: FAO GIEWS at http://www.fao.org/giews/pricetool/

Differences in quality account for some of the price differences. Nearly half of the imports are grade 2 and about 6 percent of the imports are grade 1. Ghana does not produce any grade 1 rice. Only 4 percent of Ghanaian rice production is grade 2. The bulk of it (83 percent) is grade 5 (USAID 2009).

SEGMENTED MARKET

The rice market is segmented by location, type of rice, and quality. Urban residents, who account for 70 percent of rice consumption in Ghana, prefer aromatic rice, while parboiled local varieties are preferred in the North. Local aromatic rice commands a 40 percent premium over nonaromatic rice at the farmgate and in local markets. Imported aromatic rice typically sells for between 25 and 35 percent more than imported nonaromatic rice. Local aromatic rice usually sells at a price of between 40 and 80 percent of the price of imported aromatic rice. Moreover, local aromatic rice from different irrigation systems fetches different prices. Producers in several regions have started to cultivate aromatic rice to capture some of the market for higher quality rice. In 2012, 45 percent of rice producers (nearly 80 percent in irrigated areas and between 24 and 35 percent in rainfed areas) were estimated to have planted aromatic varieties, such as Jasmine 85 and Togo Marshall. The prevalence of aromatic rice production also varies by region – 80 percent of rice farmers in Volta produce aromatic varieties, while only 10 percent in Ashanti do so.

GHANA'S RICE SECTOR IS NOT AS COMPETITIVE AS SENEGAL OR THAILAND'S

The total cost of producing and marketing rice in Ghana is considerably higher than in Thailand or Senegal. This is due to higher production costs, lower milling efficiency, and higher costs of milling and marketing. The cost of seasonal land preparation and crop establishment (mainly mechanization and labor costs) ranges from USD 62 to 105 per mt of paddy rice in Ghana compared with USD 31–36 in Senegal and USD 16–21 in Thailand (Table 1). Further, the milling losses in Ghana are significantly higher. A study by Winter-Nelson and Aggrey-Fynn (2008) shows that rice would be profitable even under lower output prices if Ghana raised the processing conversion rates and milled rice quality to those found in other rice-producing countries.

RICE PRODUCTION IS PROFITABLE

Rice production in the Transition, Guinea Savannah, and Sudan Savanna agroecological zones yields positive gross margins and fairly high returns on investments (Table 2). When the cost of family labor is not considered, production of aromatic rice yields gross margins that are twice those of non-aromatic rice, while irrigated rice gives three times the margins of rainfed rice. Rice

Table 1—Comparison of costs to bring rice to retail markets in Ghana and Senegal and to the port in Thailand, 2011

	Ghana		Senegal		Thailand		
	Volta	Northern	.		Northeast (rainfed)	Central (irrigated)	
	Aromatic (rainfed)	Non-aromatic white (irrigated)	White (irrigated)	Aromatic (irrigated)	Khao Hom Mali	Pathumthani 1	Suphanburi 1; Chainat 1
Total production costs (USD/mt paddy)	316	283	194	216	220	201	159
Milling yield, percent	60	55	65	65	62	62	62
Total production costs (USD/mt milled rice)	527	515	299	332	355	325	256
Farm-gate price	1111	548	444	1076	753	500	376
Total milling costs (USD/mt milled)	296	98	63	63	87	95	93
Total marketing costs (USD/mt milled)	154	130	83	83	136	74	66
Calculated value at retail (USD/mt milled)	1562	777	591	1222			
Calculated FOB price at port (USD/mt milled)					1113	763	537

Source: World Bank 2013.

Table 2—Gross margins of different rice production systems in the Transition, Guinea Savannah, and Sudan Savannah agroecological zones of Ghana, 2013

	Rice type		Irrigation	
Revenue or Cost Item	**Aromatic**	**Non-aromatic**	**Irrigated**	**Non-irrigated**
Yield (kg/ha planted)	1975	1346	2305	1346
Reported farmgate price (GHc/kg)	0.81	0.64	0.91	0.64
Gross revenue (GHc/ha)	1595.85	863.40	2104.94	863.40
Costs of production (GHc/ha)				
Hired animal use	9.67	10.40	3.85	11.16
Hired tractor/machine use	124.31	62.41	118.45	67.00
Hired labor	263.09	157.73	403.55	144.56
Fertilizer	223.52	114.03	253.13	116.57
Seed	13.78	5.31	26.45	4.06
Herbicide & pesticide	49.70	44.07	51.14	44.34
Total cash expenditures (GHc/ha)	684.07	393.95	856.57	387.69
Family labor	139.45	446.45	704.54	348.93
Own animals/machine use	54.14	58.47	33.92	61.03
Family labor and use of assets owned by farmer	193.59	504.92	738.46	409.96
Total costs (incl. family labor and assets owned) (GHc/ha)	877.66	898.87	1595.04	797.65
Gross Margins (GHc/ha)				
Without family labor costs included	**857.64**	**410.98**	**1214.45**	**414.69**
With family labor costs included	**718.19**	**-35.47**	**509.90**	**65.76**
Returns to investment (Gross margins/Total costs)	**0.98**	**0.46**	**0.76**	**0.52**
Count	*102*	*478*	*71*	*509*

Source: IFPRI/SARI Survey on medium and large-scale famers and mechanization survey, 2013

production in the Kpong irrigation area yields gross margins that are twice those of irrigated rice in the North. The profitability of local rice production is consistent with earlier studies. Akramov and Malek (2012) show that rice production by average efficient farmers in Upper West, Northern, and Brong Ahafo regions are profitable at private and social prices (if the cost of family labor is excluded). Similarly, Winter-Nelson and Aggrey-Fynn (2008) show that all rice systems they studied are profitable at both private and social prices.

YIELDS ARE LOW BUT SLOWLY INCREASING

Average rice yields in Ghana are higher than rice yields in Nigeria, Guinea, and Ivory Coast, but lower than in Mali, Senegal, and most developing countries in Asia and Latin America. Yields have been growing at 3 percent annually in Ghana from 2.0 mt/ha in 2004 to 2.5 mt/ha in 2012, while on-station trials suggest achievable yields of between 6 and 8 mt/ha. The growth in rice yields in Ghana is slower than the recent annual growth of 4.6 percent in Mali and 3.9 percent in West Africa as a whole. Senegal has increased rice yields by 8.2 percent annually since 2004 by expanding production under irrigation.

Rice is mostly a rainfed lowland crop in Ghana: 76 percent of the cultivated area in all regions was on lowlands; 16 percent on rainfed uplands; and 8 percent in irrigation systems. Almost all (99 percent) farmers in irrigated areas, 53 percent of farmers in lowland rainfed areas, and 49 percent in upland rainfed areas grow improved varieties of rice. The majority (78 percent) of farmers in irrigated areas, 33 percent in lowland areas, and 24 percent in upland areas planted aromatic varieties.

There is no rice breeding in Ghana; all varieties released and planted were developed in other countries. Most of the 21 rice varieties released since the 1970s are suitable for lowland ecologies.

Table 3—Key production practices and rice yields in Ghanaian irrigation areas

Irrigation area:	Kpong	Afife	Tono	Vea	Bontanga
Average paddy yield (all varieties) (mt/ha)	5.5	3.0	3.3	1.3	2.6
Major varieties planted	Jasmine 85, Jet Tree, Aromatic Short	Togo Marshall	Jasmine 85	Jasmine 85, Agric	Jasmine 85, Kpasogu
Price of Jasmine rice (GHc/kg)	0.88		0.64	0.52	0.66
Jasmine 85 yield (mt/ha)	5.5		3.2	2.0	2.5
Fertilizer use for Jasmine 85 (kg/ha)	646		402	192	326
Using seeds from formal sector, percent of farmers	57-85	0-8	59-86	0-7	0-33
Land prepared by power tiller (figure in parentheses includes tractors), percent of area	100	23 (56)	23 (90)	3 (3)	2 (90)
Harvested with combine harvester, percent of area	48	33	13	20	0
Use informal credit, percent of farmers	52	24	2	9	18
Cultivated under a sub-leasing arrangement, percent of area	33	0	1	0	11

Source: Takeshima et al. (2013); raw data from CRI/SARI/IFPRI survey (2012–2013).

Varieties for upland ecologies were first released in 2009. Jasmine 85, an aromatic variety, is by far the most popular improved aromatic variety in all rice ecologies. It accounted for nearly 99 percent of the rice seed produced in 2011 and was planted on 27 percent of rice area in 2012. However higher-yielding varieties, albeit non-aromatic, are now available. Moreover, Jasmine 85 is also thought to be susceptible to both rice blast and rice yellow mottle virus (RYMV), two major diseases that damage rice in Ghana. A study by Ouluyemi (2014) with support from the Crops Research Institute also found many significant differences, including yield potential, between seeds from seven different sources being claimed as Jasmine 85. This suggests that the Jasmine 85 seed circulating in Ghana is inconsistent and impure, which is likely due to impure breeder and foundation seed. A new aromatic variety, AgraRice (IR-841), was released in 2013.

Although there is a formal Seed Release Committee, multi-locational testing of new rice varieties is not done systematically. Different varieties are tried by farmers or are tested by the Council of Scientific and Industrial Research (CSIR). Additional trials are also conducted within specific irrigation systems. Most of the certified rice seed in Ghana comes from various projects, as a commercial rice seed sector has yet to develop.

PRODUCTIVITY OF RAINFED LOWLAND RICE

Average rainfed lowland rice yields are between 1 and 2 mt/ha in Ghana, lower than in Thailand, Mali, and Senegal. Moreover, lowland rice yields vary widely from less than 1 mt/ha to 8 mt/ha. Yields are higher by 1 mt/ha in Ghana's south than in the north.

Statistical relationships between yield and related factors suggest that seed priming (soaking seeds in water overnight, drying them, and then sowing them as usual); intensity of fertilizer use; access to extension services; location; and the use of certified seeds are the principal factors explaining differences in rainfed lowland rice productivity. The application of one kg/ha of nitrogen gives an additional 15-18 kg/ha of paddy (Ragasa et al. 2014), which under irrigation increases to 30-35 kg/ha of additional production. In lowland rainfed conditions, 69 percent of farmers applied fertilizer, although at about half the recommended rate. The key reason cited by non-users of fertilizer in the forest zone was that their plots were perceived to be fertile and therefore they did not need fertilizers. In the Northern Savannah, farmers who did not use fertilizer explained that fertilizers are expensive and that they lacked funds. The use of certified seeds also yielded considerably more rice. In rainfed lowlands, plots planted with certified seeds yielded 830 kg more per ha than other plots. However, only 11 percent of farmers in rainfed areas used certified seeds (4 percent in the North and 22 percent in the South).

Farmers who indicated that they received advice from an extension agent in the previous two years had yields that were 300 kg higher than farmers who did not receive such advice. Practices such as priming, bunding, and leveling seem to have significantly increased yields. Seed priming yields 335 kg more, although only 21 percent of farmers in rainfed areas practice priming, compared with 63 percent in irrigated areas. Producers said the unavailability of power tillers limits their ability to level and bund.

PRODUCTIVITY OF IRRIGATED RICE

Irrigated rice yields are higher than rainfed rice yields, but vary from between 5.5 and 8.0 mt/ha in Kpong to less than 2 mt/ha in Vea (Table 3) (Ragasa et al. 2013; Takeshima et al. 2013). Except in Kpong, these yields are generally lower than those obtained by irrigated rice farmers in Asia and other West African countries. Most irrigation in Ghana is provided through formal government schemes rather than the private sector. Statistical analysis of yields suggests that fertilizer use intensity and the use of certified seed explain most of the variation in yield across the irrigated areas (Ragasa et al. 2014). Controlling for other factors, the use of certified seeds yields 1 mt/ha over the use of recycled seeds.

Irrigation systems themselves explain some of the differences in yields. Water control, for example, is far higher in Kpong, where the highest yields are observed. In Kpong, transparent land ownership and secure tenant's rights also appear to have led to a vibrant land rental market. The high profitability of rice production that employs appropriate seeds and controls water properly has led the private sector to increase the availability of informal credit, power tiller services, mechanized harvesting, milling, and trading services to producers in the Kpong system. Certified seed are also produced on site in Kpong, leading to higher adoption (Table 3).

SUMMARY AND POLICY IMPLICATIONS

- Expanding rice production under irrigation would be the most effective way to increase rice production in Ghana,

but would require substantial public investment. To produce an additional 200,000 mt, nearly 40,000 ha will have to be brought under irrigation.

- The use of improved rice varieties in lowland and upland systems and certified seeds in all systems needs to be increased substantially. Greater attention needs to be given to developing and promoting aromatic varieties that perform better than Jasmine 85.
- The effectiveness of extension needs to be increased to improve rice husbandry practices such as the use of appropriate varieties and certified seeds, as well as bunding, leveling, and seed priming practices that can improve productivity substantially.
- Increasing the productivity of irrigated rice will require replicating the factors that have contributed to high productivity in the Kpong irrigation system: greater water control, secure tenure, effective extension, and reliable supply of certified seeds.
- Improved milling is another way to substantially improve the competitiveness of Ghanaian rice by reducing losses and improving quality. The private sector is already responding to such opportunities by establishing mills along with large-scale rice production.

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