Proceedings of the Second Annual Meeting of the African Fertilizer Trade and Marketing Information Network

Lomé, 15-17 November 1989

DGIS/IFDC/LEI

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Foreword

From November 15-17, 1989, IFDC-Africa organized the Second Annual Meeting of the African Fertilizer Trade and Marketing Information Network or AFTMIN II, Lomé, Togo.

The previous year at the conclusion of AFTMIN I, attention was given to the need for African marketing people to meet in an informal manner and discuss their common problems and the ways that international agencies could assist in solving them. The importance of such a meeting was underlined when 41 participants, speakers, and observers from 22 countries were represented and registered for AFTMIN II;. Four donor agencies sent their representatives: Canadian International Development Agency (CIDA), Directoraat Generaal voor Internationale Samenwerking (DGIS), European Economic Community (EEC), and United States Agency for International Development (USAID).

The meeeting focused on ways to reduce costs of fertilizer imports and marketing in sub-Saharan Africa. The first item that was discussed in detail was alternative fertilizer supply systems for this continent, whereby the emphasis was placed on the option to import in bulk and use local bagging or to import bulk-blended materials. The second issue was the problems that surround fertilizer imports financed by bilateral or multilateral donors; this topic was selected as the second lead issue because fertilizer aid either as balance of payment support or as part of structural adjustment programs constitutes an important source of supply to Africa. After presentations on key topics by leading experts in the field, both themes were further discussed in working groups, which culminated in a series of recommendations.

Keynote Address

Distinguished Delegates
Honorable Guests
Ladies and Gentlemen

Once again it is a sincere pleasure to welcome you to Lomé to attend the annual meeting of the African Fertilizer Trade and Marketing Information Network, organized by IFDC-Africa. It is indeed heartening to see that many of you have undertaken a long trip to join your colleagues to discuss common problems, share experiences, and exchange information in order to better serve the fertilizer sector for which you have responsibility. It is with great satisfaction that we observe the increasing level of participation and interest in this meeting: it signals the importance attached to AFTMIN activities by our collaborators. On the occasion of this second meeting, organized by IFDC, we take pride in the rapport we have established within the region and the growing commitment to the Network.

As you all know, the fertilizer sector in Africa will have to grow enormously if food self-sufficiency is to be attained. From the current consumption of around 1.2 million tonnes/year, consumption would have to grow to nearly 5 million tonnes in order to meet food requirements in sub-Saharan Africa projected for the year 2000. Even today, fertilizer supply in sub-Saharan Africa is largely from imports. In 1987/88, fertilizer consumption was estimated at 1,172,000 tonnes of nutrients, with imports contributing 994,600 tonnes. The import/production ratio improved from 5.3 to 3.6, due largely to the commissioning of the fertilizer plant in Nigeria. With no additional fertilizer production capacities announced or planned, imports of fertilizer will play a major role in the region in the foreseeable future. These projections are placing demands on the donor community as well as on national programs. Even if the donor community is willing to shoulder the financing of these inputs initially, the costs involved may be insignificant when compared with the investments necessary to develop skilled personnel, marketing systems, and infrastructure.

Thousands of positions will need to be filled over the next decade to allow for the smooth delivery of fertilizers. Moreover, clear policies will have to be designed and adopted in order to assure an orderly development of the procurement and marketing systems. IFDC expects to play a role in meeting these challenges, principally through the provision of information services, advice, and training. AFTMIN is the key to our involvement in these developments. We wish to recognize the pioneering role that our principal donor, the Government of the Netherlands, has played in AFTMIN. It is their support that makes this meeting possible.

The principal aim of AFTMIN is to reduce the farmgate price of fertilizers. The costs of fertilizer procurement (f.o.b. cost, freight and internal marketing costs) are a major drain on

government funds. The prices of fertilizer in the region are high because of low volumes (often less than 5,000 tonnes/tender), odd grades (such as 14-23-14+55+1S), which are made-to-order, and shipment in bags. Moreover, marketing costs and margins in sub-Saharan Africa vary between $50-$177 as compared to $18-$71 in Asia. Discussion of ways and means to reduce these costs will continue in the AFTMIN forum and hopefully will lead to measures that will reduce the financial burden on countries and farmers alike.

An encouraging development for the Network is the prospect of the joint involvement of the Food and Agriculture Organization of the United Nations (FAO) with IFDC in AFTMIN. Funds were made available to FAO by the Belgian Government to second a fertilizer marketing team to IFDC-Africa. This will bring the total staff in Lomé to six, not counting the substantial backstopping capabilities of the associated organizations such as Food and Agriculture Organization of the United Nations (FAO) and IFDC headquarters as well as Agricultural Economics Research Institute (LEI), Economic Commission for Africa (ECA), United Nations Industrial Development Organization (UNIDO), and other interested parties. This cooperative arrangement should vastly expand our capabilities to address the challenges facing the fertilizer sector of Africa and should allow new initiatives to be undertaken in the future.

The focus of this AFTMIN meeting is Fertilizer Aid and Alternative Supply Strategies. Clearly there are different points of view when it comes to future developments in the sub-Saharan African fertilizer sector, dependent on whether one is the exporter, the importer, the donor, or the local producer. Yet, it is paramount that a common approach emerge in order to avoid incongruent strategies on the part of the different partners in this endeavor. This meeting aims at a frank dialogue between the different players in this game, which hopefully will lead to a better understanding of the respective priorities. We are pleased with the response from the donors and the producers to share their concerns with the AFTMIN participants. I sincerely hope that the discussions will be informative and constructive and will eventually help to improve the supply of fertilizers in the region.

As usual, the Government of Togo has facilitated the entry and stay of our participants in the country. The hospitality of Togo and its people is by now well known to IFDC and its collaborators. We are privileged to be hosted here. I hope that your stay in Togo will be agreeable. If you need information or assistance, feel free to contact Messrs. Frederick, André, or Coster, who are responsible for your well being.

I hereby declare the second annual meeting of the African Fertilizer Trade and Marketing Information Network opened.

Thank you.

P.L.G. Vlek, Director IFDC-Africa

1. Fertilizer Supply Options: The Principles[1]

Introduction

During the past two decades, we have experienced exceptional growth in food production throughout the world. There have even been increases in sub-Saharan Africa in spite of the problems of drought and insect plagues. However, on a per capita basis, sub-Saharan Africa has experienced a decline in food supply over the past decade because of rapid population growth, which has surpassed the ability to increase crop yields. In most instances where food production has increased, fertilizers were an integral part of the production package that was used. Much of the growth in the agricultural sector has been attributable to the increased use of fertilizers, improved agronomic practices, and use of improved crop varieties.

FAO estimates that, of the food increases required by the year 2000, fully 70% must come from intensification of agriculture rather than an expansion of area, which means better utilization of scarce resources to produce more food using existing agricultural land. Whereas the cost of seeds and fertilizers in developed countries accounts for 10%-30% of cash input for crop production, the cost of fertilizers alone accounts for more than 50% of cash expenses in many developing countries, (Table 1).

Table 1. Portion of Cash Expenditures Attributed to Cost of Fertilizer for Selected Locations and Crops[a]

Country	Crop	Expenditure on Fertilizer, as Percentage of Total Cash Expenditures	
Argentina	Wheat	6	
Cameroon	Coffee[b]	9[c]	(40-50)[d]
	Maize[e]	9[c]	(40-50)[d]
Colombia	Potatoes	30-35	
	Cereals	15-25	
Kenya	Maize	65-75	
United States	Maize	24	
	Cotton	8	
	Soybeans	6	
	Wheat	18	
Venezuela	Cereals	5-10[c]	(25-35)[d]

a. Derived from USDA data for United States and IFDC estimates for others.
b. Established planting.
c. Estimates based on subsidized fertilizer prices.
d. Actual, assuming no subsidy.
e. Intercropped with coffee.

1. M.T. Frederick, IFDC-Africa.

Substantially increased manpower needs in all areas of the fertilizer sector are forecast. One such estimate (Mudahar) projects a need for 32,000 additional workers in sub-Saharan Africa alone in the 20-year period 1982-2002. This estimate is based on an optimistic growth rate of fertilizer consumption reaching 3.5 million nutrient tonnes in 2002 compared with a present use of about 1.12 million tonnes. About half of this manpower increase is estimated to be required in the area of fertilizer production, which reflects an anticipated extensive expansion in the African fertilizer industry. Perhaps we are already experiencing this expansion with increased production capabilities in countries like Nigeria.

Efficient Fertilizer Supply

When speaking of fertilizer supply options, we are concerned with all areas of fertilizer supply, that is, all the variations that would result in a country's receipt of an adequate amount of fertilizer materials on a timely basis, including procurement and distribution. The first item that needs to be considered is the source of the fertilizer. There are two basic sources: (1) local production and (2) import. Under local production we can consider production using local raw materials and production based on imported raw materials. We must also consider the technology of production including the following:

(a) The process used and the products that result.
(b) The complexity of the processes and scale of production.
(c) The logistics of the supply of raw materials and distribution of products.

What choices exist in fertilizer supply in sub-Saharan Africa? First, consider the constraints faced by the countries in the region. Regional consumption in general is low (Table 2).

Fertilizer use in sub-Saharan Africa has increased from about 101,000 tonnes (nutrient) in 1960 to about 1.12 million tonnes in 1988. Of 40 countries studied by FAO, only 11 averaged more than 30,000 tonnes of fertilizer nutrients for the years 1984-1986. Nigeria was the highest with 285,600 tonnes, and Zimbabwe was second with 157,000 tonnes, followed by Zambia with 67,500 tonnes. All the remaining countries used less than 50,000 tonnes, and 17 countries used less than 5,000 tonnes of nutrient.

Sub-Saharan Africa accounts for about 10% of the world's population but consumes only about 1% of the world's fertilizer. The intensity of fertilizer use, measured by use (kg/ha) on arable land, varies widely throughout the world, e.g., 228 kg/ha used in Western Europe and less than 12 kg/ha in developing countries of Africa. The world average is 87 kg/ha. What is apparent in sub-Saharan Africa is a pattern of extremely low fertilizer use, especially in the food crop sectors of most countries. In fact, a recent IFDC study in Benin found that even though total fertilizer use was slightly less than the average

for sub-Saharan Africa, the use of fertilizers on food crops was less than 1 kg/ha.

Table 2. Trend in Fertilizer Consumption in Selected West African Countries[a]

Country	Nutrient (N + P_2O_5 + K_2O) Consumption							
	6-Year Total (1970-75)				5-Year Total (1981-85)			
	N	P_2O_5	K_2O	Total	N	P_2O_5	K_2O	Total
	(tonnes x 1,000)							
Burkina Faso	2.8	2.1	0.5	5.4	15.2	16.8	12.2	44.2
Cameroon	52.6	11.9	25.7	90.2	113.0	34.8	61.0	208.8
Côte d'Ivoire	44.6	22.6	90.2	158.1	58.4	41.0	114.8	214.2
Ghana	20.2	15.9	10.0	46.1	46.5	24.0	27.4	97.9
Guinea	7.0	2.0	5.4	14.4	1.7	2.6	2.6	6.9
Mali	14.5	16.9	0.7	32.1	39.5	16.9	15.2	71.6
Niger	0.8	0.5	0.2	1.5	7.6	4.5	2.0	14.1
Nigeria	62.1	47.4	19.8	129.3	535.2	391.4	203.1	1,129.7
Senegal	36.0	49.6	45.3	130.9	39.5	51.1	37.1	122.7
	240.6	168.9	198.5	608.0	856.6	583.1	475.4	1,915.1
Average Annual Consumption	40.1	28.2	33.1	101.3	171.3	116.6	95.1	383.0
Average Total Annual Consumption for All Africa				1,909				3,428

a. Values and totals may vary slightly due to rounding.

Source: FAO data compiled by the Tennessee Valley Authority (TVA).

Fertilizer Production

With the startup of the Nigerian Fertilizer Company (NAFCON) facility in Nigeria in 1987, the production of fertilizer has increased to 276,000 tonnes (N plus P_2O_5) in 1988. This plant alone accounts for almost a 40% increase in production in the region. Recent data indicate a capacity utilization of 105% for the NH_3/urea unit and something over 70% for the DAP/NPK unit. This compares favorably with other well-run fertilizer plants operated worldwide. Other production units have not been as successful as this one. Some units in Africa have suffered various types of production difficulties which resulted in low capacity utilization. For example, the single superphosphate (SSP) unit also located in Nigeria has been shut down since June 1988. This plant was constructed in 1976 and never reached more than 40% capacity utilization. The NPK production unit in Côte d'Ivoire had production problems and was shut down but was reportedly bought by Norsk Hydro. Although nitrogen production facilities were built

in Sudan and Madagascar, they could not be operated because of a lack of foreign exchange to purchase the naphtha needed as a raw material for ammonia production. In Cameroon, the superphosphate/NPK facility was closed after only 5 years of operation primarily because the cost of production based on imported raw materials was higher than the cost of imported fertilizers. A bulk-blending plant was built in Benin in 1984 but reportedly has never operated because of a lack of funds to import fertilizers in bulk.

Many countries have considered local production as a supply option based on an overly optimistic estimate of growth in local fertilizer demand-such was the case with Benin. Fertilizer demand was predicted to grow about 200% the year the plant was completed and then to double by 1988. In reality, the fertilizer demand in Benin remained about constant at the pre-1984 level.

Available Options

There are several fertilizer supply options for developing countries, and most are dependent on the level of fertilizer use. Among the options of different import schemes and varying production plans, there are also methods to decrease the cost of procurement of imported fertilizers and the possibility for use of appropriate technology to make use of some indigenous raw materials. If we consider the extremely important area of demand forecasting, which was previously mentioned under the section on production, we can see that this activity has an enormous impact on the entire procurement process. The lack of priority given to the procurement of fertilizers and the involvement of many governmental departments can sometimes result in a loss of control and the inability of any one organization to have financial responsibility and accountability in the area of fertilizer procurement.

Table 3. Estimated Landed Costs and Savings Due to Improved Management of Fertilizer Procurement in Cameroon

Fertilizer Material	Landed Cost[a]		
	Current System	Improved System	Savings[b]
	(US $/tonne)		
Ammonium sulfate, 21% N	226	190	36
Urea, 46% N	283	234	49
Diammonium phosphate, 18% N, 46% P_2O_5	335	301	34
Potassium chloride, 60% K_2O	230	194	36
20-10-10 Compound	281	245	36
15-15-15-6S-1B_2O_3 Compound	293	256	37
22-10-15-5S-1B_2O_3 Compound	313	279	34

a. Includes f.o.b. cost of fertilizer in 50-kg bags, ocean freight, all port charges, and movement to storage facility adjacent to port.

b. Savings due primarily to consolidation of orders resulting in lower f.o.b. prices, lower ocean freight rates, and lower handling costs.

Table 3 shows the result of improved procurement and demand forecasting procedures used in Cameroon. It appears from this information that an average savings of about $35 per tonne resulted from changes in the procurement procedures. Several Government-authorized importers were able to increase the savings by importing in bulk and bagging at the port using leased bagging equipment. One such operation reported a savings of $50 per tonne over the cost of the Government-operated system.

For countries/subregions using less than 40,000 tonnes (product basis) per year, the option of importing bagged fertilizer is generally considered the most efficient means of supplying fertilizers. The level also depends on the local circumstances. In a study for USAID in Bolivia in 1978, IFDC reported that savings of about $50 per tonne were realized by a cooperative that imported only 1,500 tonnes of fertilizer. This saving was due primarily to the direct import by the cooperative, improvement of tendering procedures, and elimination of one step in the procurement chain. For bulk imports with local bagging to be viable, a level of 50,000 to 75,000 tonnes is required. This practice has been successfully employed at lower rates in both Kenya and Cameroon. Bulk blending which consists of bulk imports with local blending and bagging of specific grades would usually become viable at levels from 75,000 to 100,000 tonnes. As consumption increases to above 150,000 tonnes, the production can move toward granulation based on imported and local raw materials. Above 250,000 tonnes per year, capital-intensive units based on indigenous resources and geared toward local consumption and export markets begin to seem viable.

When considering the cost of the various options (Figure 1), we see that the cost goes up with the complexity of the production plan and with the size, which is just as would be expected. The approximate fixed capital investment required is in the $0 to $5 million range for the option of importing in bulk and bagging locally and increases to $2-$10 million for blending, $10-$40 million for granulation, and $100-$500+ for the so-called world class plants.

The options of bagging locally and blending and bagging are relatively straight-forward. Granulation, however, requires looking at several options. There are three major processes for producing granular multinutrient fertilizers: compaction, steam granulation, and chemical granulation. It is probably sufficient here to refer to Figure 2, which shows the production cost at various capacity utilization rates. These differences between the processes are due partly to the increased complexity of operation and the increased capital requirements.

There are problems when considering production options in many of the countries of the region:

1. The demand is low, which in most cases prevents the plants from operating in the economic range of capacity utilization.

Figure 1. Stepwise Development of Fertilizer Supply Units

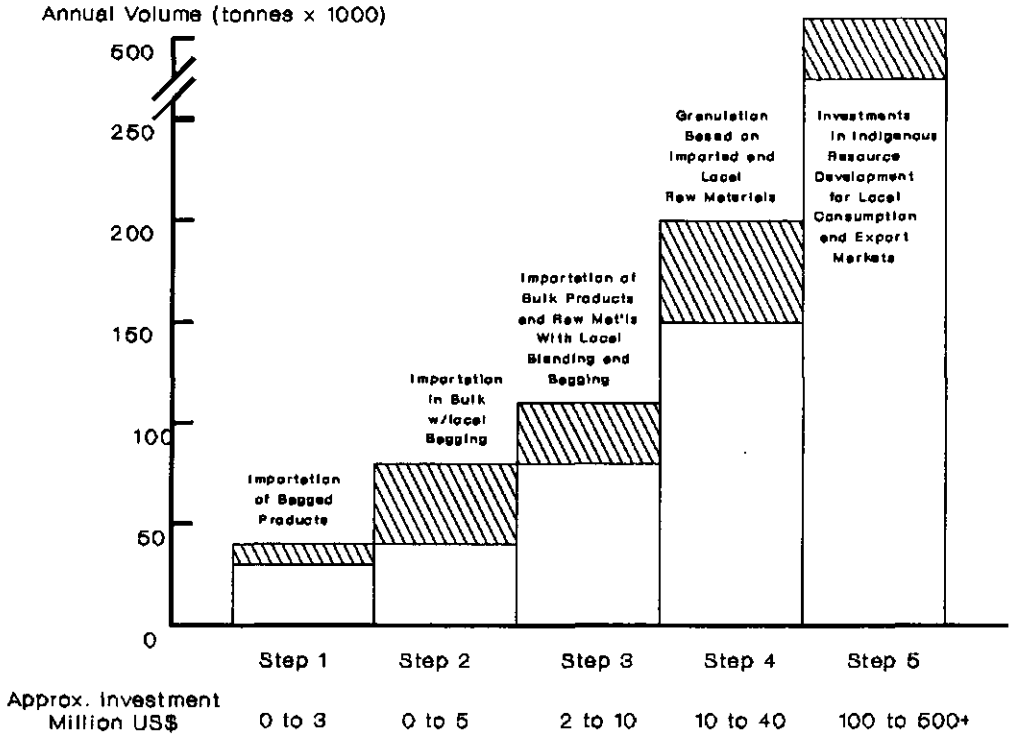
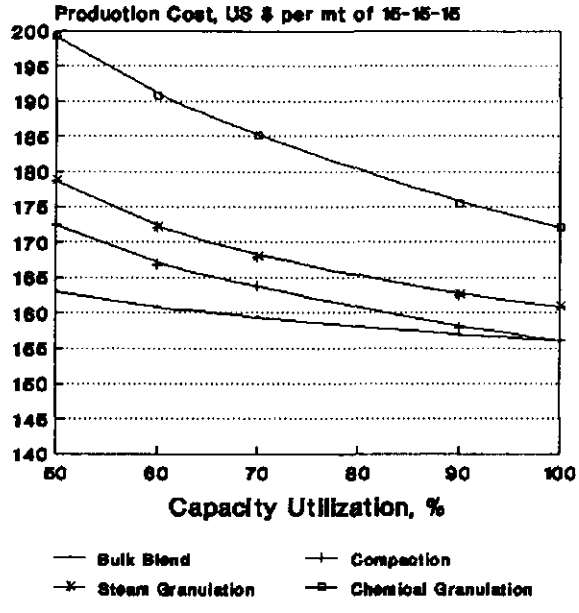


Figure 2. Capacity Utilization vs. Production Costs
(For Various Production Processes)



One can see that this is not as important for a bulk blending unit as for a more complex chemical granulation facility.

2. In many countries there is a lack of fertilizer raw materials on which to base local production. Even countries that have phosphate deposits generally lack sources of acids with which to solubilize the phosphate. Countries like Nigeria with large supplies of natural gas to produce nitrogen fertilizers must still import their total requirement of phosphate and potash.

3. The cost of production in small units tends to be relatively high. The competition in the fertilizer market is determined by the large producers who are making standard products-the commodities of the fertilizer market-urea, DAP, and NPK fertilizers such as 15-15-15. These materials are made in huge factories at production rates of hundreds of thousands of tonnes per year. In Indonesia, for example, urea production has grown from 100,000 tonnes in 1967 to about 4.5 million tonnes in 1988-a phenomenal increase.

Fertilizer supply also denotes the delivery of the fertilizers to the use areas-in our case the farmers. The objective would be to minimize costs by moving the material through the system as efficiently as possible. Movement of fertilizers in Africa is an extremely difficult and costly proposition. In many cases, the fertilizer has a low perceived value; hence, it is not given priority in movement. Often government agencies are involved in forecasting demand and ordering the fertilizers, and because of lack of coordination, mismanagement, or lack of foreign exchange, the fertilizer may not arrive on time.

Table 4. Comparison of Production Costs of PAPR and NSPP[a, b]

	Granular PAPR (Includes H2S04)	Granular PAPR (Imported H2S04)	Granular NSPP (Imported H2S04)	Bagged SSP[c]	Bagged TSP[c]
Plant capacity (mtpd)					
Product	270	270	70	-	-
P2O5	60	60	19	-	-
P2O5 Content of product, %	22	22	26.5[d]	18	46
Capital Investment	----------	----------	US $ X 1 million	----------	----------
Fixed capital	17.2	13.6	6.9	-	-
Working capital	1.7	2.0	N/A	-	-
Total Capital Investment	18.9	15.6	6.9	-	-
Production Cost	----------	----------	US $/mt	----------	----------
Raw material	33.5[e]	56.0[e]	101	-	-
Variable conversion	24.1	24.7	32	-	-
Fixed conversion	48.6	38.1	20	-	-
Total Product costs					
Product basis	105.2	118.8	153	123	205
P2O5 basis	478.2	540.0	546[d]	683	445

a. Basis for plants and calculations are not the same, hence are not directly comparable.
b. Derived from data from IFDC (18) and CIRAT (19).
c. Prices based on import to northern Nigeria based on prices of late 1989.
d. P2O5 content – NSPP also contains 1.5% N. Calculations based on 28% total nutrient.
e. Does not include approximately 1,000 km transport charges for sulfur or sulfuric acid.

The lack of priority given to fertilizer is evident in Table 4 in a comparison of annual fertilizer tonnage with imports of cement and cereal grains in selected countries. In most cases the requirement for cement and grain must be perceived as much more important than the fertilizer. In all the cases noted, except one, cement is used in quantities of at least 2 and up to 20 times that of fertilizer. The point is that the cement, grain, and other goods such as lumber are moved through the system because their perceived importance is universally high while fertilizers are perceived as important only to the group of farmers who are using them. Since the quantities of fertilizers moved within this region are relatively low, it is normally not practical to have a distribution system solely dedicated to fertilizer. This means that the fertilizer must compete for scarce transportation resources with the other imported goods as well as export commodities such as cacao, coffee, and cotton.

Figure 3 depicts those regions of Africa that are within 500 km of a port. One can see that the vast interior of Africa is removed from ports and thus transportation costs are high. IFDC's study in Burkina Faso indicated that transport alone accounted for $70 to $100 per tonne for fertilizer at the farm gate.

Option of Regional Cooperation

For markets that are too small to support their own production or where raw materials are not equitably distributed, the possibility of regional production serving the many small markets could provide a viable option. This approach has been studied by

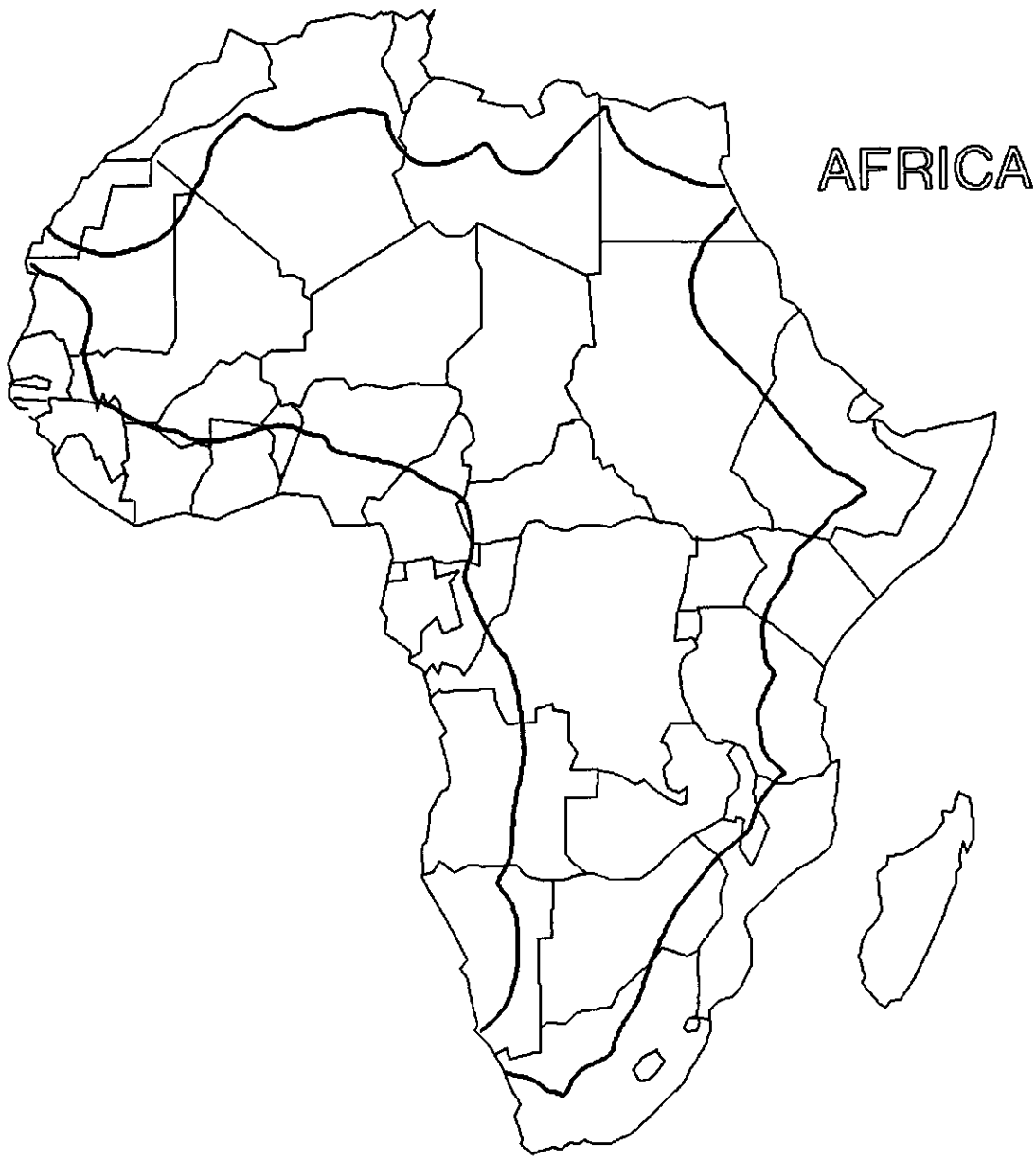


Figure 3. Areas Within 500 km of African Ports

several countries. The Liptako Gourma Authority has been considering use of local phosphate in Burkina Faso to supply fertilizers to surrounding countries, and Togo has considered a similar option to get production to a level that would justify construction of a small granulation unit. Regional cooperation on a larger scale has been tried in Asia where the Association of Southeast Asian Nations (ASEAN) has built plants in Indonesia and Malaysia to supply urea to the member countries.

Another option is group imports to take advantage of volume discounts and to reduce shipping charges. This could be undertaken by groups of countries that are now importing small quantities of 3,500 tonnes at a time. Three such groups would result in a single product tender of over 10,000 tonnes, which has been mentioned by some European suppliers as a cutoff point for obtaining prices near the world market price and concessions on shipping. Rationalization of products requested in tender documents would be required for this option to be viable for most countries. This idea will be discussed in more detail in a later presentation.

Summary

Even though sub-Saharan Africa has many constraints to overcome in the efficient supply of fertilizers to its farmers, there are options available for consideration:

1. Import finished fertilizers in bags.
2. Develop regional cooperation in importing to increase efficiency in shipping and purchase price.
3. Import bulk materials and bag locally.
4. Import bulk materials and prepare blends locally and bag.
5. Where raw materials and market factors are favorable, produce materials locally.
6. Develop regional cooperation in production to allow high capacity utilization rates in new factories.

In order for these options to be implemented in any country, they must be judged under the following criteria:

1. The agronomic suitability of the products.
2. The flexibility in meeting demand.
3. The validity of the demand forecast-expected volume.
4. The product's suitability to climate and distribution criteria.
5. Level of investment required and financing options.
6. The infrastructural requirements.

2. Investing in Fertilizer Facilities in Sub-Saharan Africa[2]

I am delighted to be invited to join other participants in sharing thoughts and experiences on the issues before this conference. It is common knowledge that while it is imperative to provide farmers with adequate farm inputs for the cropping season each year, it is also important to ensure that such inputs, especially fertilizer, are available at affordable prices. This is particularly true in view of the key role which fertilizer will play in providing much-needed increased food production and food self-sufficiency in Africa.

The National Fertilizer Company of Nigeria Limited (NAFCON), is committed to the objective of improved supply of fertilizer to the Nigerian market. In addition, NAFCON has had and should continue to have impact on the fertilizer supply capability of sub-Saharan Africa. The overall supply situation in the region so far points to the desirability of economically viable production facilities. It is thus important to identify and discuss some of the priority elements necessary for a viable investment in fertilizer production facilities. Allow me to share some of our experiences in NAFCON.

Raw Materials

The issue of raw materials does not end with nominal availability in the sub-region. There have to be commercially viable key raw materials at relatively low prices to guarantee investment in fertilizer production facilities. In the case of NAFCON, natural gas, phosphoric acid, and potash constitute the primary inventory of key raw materials.

Nigeria has an abundant supply of natural gas, which is the major raw material in the production of ammonia. The NAFCON facilities are fed from the nearby Alakri gas field through a dedicated pipeline network that guarantees steady supply and reasonable prices. This made it possible for the company's products to remain competitive in both the local and international markets. Any raw material price configuration that negates the competitiveness of locally produced fertilizer will definitely undermine the profitability of such investment.

The company is sponsoring a rigorous research program in Nigerian universities to facilitate options for local sourcing of other important raw materials. Until local sourcing is possible, such raw materials as phosphoric acid and potash have to be procured from the expensive import market. With Senegal as the only regional source of supply of phosphoric acid, perhaps more effort should be placed in the joint development of phosphate raw

2. Paper presented by G. Polley, Managing Director of NAFCON.

material deposits in the region. This would help to make fertilizer facilities in sub-Saharan Africa a more attractive investment.

Spare Parts

Fertilizer plants involve a 24-hour daily operation, with an average on-stream time of 330 days each year. This requires a large spare parts inventory at all times to ensure prompt and proper maintenance of the plant. At present, the spare parts requirement of the plant can be fully met only through importation. This demands a substantial foreign exchange outlay each year.

The need for spare parts offers a challenge for the development of the machine tools industry as a regional imperative. An efficient machine tools industry would readily produce for the spare parts market and thereby reduce the recurrent foreign exchange burden on fertilizer plant investment. In addition, if there were multiple plants of similar design in the region, a spare parts pool could be implemented.

Market

As an overview, the demand potential for fertilizer is very positive from both the domestic and export market perspectives. Indications are that, with increasing efforts to combat the food crisis worldwide and the subsequent attention to the gross under-fertilization of sub-Saharan Africa, fertilizer facilities present a very attractive investment option. This is especially true for sub-Saharan Africa. A closer look at the specific market sectors will be useful in this regard.

Local Demand

Nigeria presents a good index of the fertilizer demand trend in sub-Saharan Africa. The country has recorded a phenomenal increase in fertilizer nutrient consumption over the past decade: 248% for N, 477% for P_2O_5, and 850% for K_2O, according to a study by the International Fertilizer Industry Association. In simple quantitative terms, Nigeria's average use jumped from 35,000 tonnes of fertilizer in 1965 to 745,000 tonnes of fertilizer in 1980.

Though total demand has since gone over one million tonnes of fertilizer, Nigeria's average use of 6.5 kg/ha lags very far behind the world average of 68 kg/ha in 1982. In addition, less than half of the country's arable land area is at present under cultivation. With less than 20 million ha of farmland in the 71.2 million ha of cultivable area, there is no doubt that more land will be brought under cultivation. Both indicators point to a consistent trend of increasing local demand for fertilizer in Nigeria.

Export Prospect

Based on current analysis, the potential shortfall in fertilizer supply in the world market is expected to come into focus in the first half of the next decade. To combat the predicted shortfall, the market requires about 50 additional world-class ammonia and urea plants between 1991 and 1996. The opportunities for downstream industries further strengthen the overall market potential of fertilizer facilities in sub-Saharan Africa.

In the case of NAFCON, these prospects have crystallized into a clear plan for expansion over a ten-year period. The expansion program while improving domestic supply of fertilizer and down-stream industries will also enhance the potential for maximum returns on investment in the fertilizer facilities.

Expertise and Infrastructure

The issue of expansion of fertilizer facilities brings one quickly to the question of expertise and infrastructure necessary for their safe and efficient operation. In sub-Saharan Africa (and indeed for most of Africa), the technical expertise required by the fertilizer industry is not readily available. This is due to the fact that there are very few plants in the region. A definite manpower development program, with emphasis on the technical and specialized skills, must be implemented. This can be integrated into the project implementation schedule in order to provide adequate training opportunity for indigenous personnel. The training program goal and an environment of mutual cooperation and positive interaction between foreign technical experts and their indigenous counterparts or trainees must exist.

NAFCON's training program was designed by M.W Kellogg as the technical partner. Right from the design stage of the plant, a group of indigenous staff, well qualified in the relevant engineering fields, joined international consultants and the project consortium in different parts of the world to work on the project. This was backed up with the opening of a training center in the NAFCON complex, where foreign experts with relevant qualification and commitment to the program have been working with Nigerian engineers and technicians. Also, necessary international experience in the specialized areas of marketing, finance, and human resource management are provided to enhance the performance of Nigerian staff.

The program, which has over 800 Nigerian engineers and technicians, involves both trainer and trainee in monitoring and certification of performance to ensure objectivity. Through clear program goals and calendar schedule, the expatriate work force, which was 160 at the initial startup of the plant in 1987, is progressively being reduced. Approximately 90 expatriate staff will be left by the end of 1989.

The total staff strength of 1,400 Nigerians is exposed to a process of rigorous training and career development, necessary to

provide an enhanced technical base for the future expansion of the fertilizer industry in Nigeria. This element of forward planning is also necessary in the provision of reliable infrastructure to guarantee uninterrupted and efficient operation. These infrastructural needs include electricity, water, access roads, housing and dock facilities. NAFCON provided these infrastructural items with sufficient capacity to meet future expansion of the fertilizer plant. Though this approach made the initial investment very costly, ongoing expansion efforts have been enhanced by the economics of maximizing these infrastructural facilities.

In view of the developing character of the region's economy, it would be desirable for the governments to provide the necessary infrastructural base for the fertilizer industry. Alternatively, governments could also write off the cost of such infrastructures where adequate provision did not exist.

Government Policy

From the foregoing, policy imperatives become easily discernible. The price of raw materials, especially natural gas, needs to remain low enough to attract investment. Any pricing situation that could negate the market competitiveness of locally produced fertilizer should be firmly discouraged by a consistent government policy on natural gas (and other raw materials).

There is the need to guarantee that necessary approvals required for a successful investment in fertilizer facilities will be provided on time. Government policy in this direction should identify and eliminate bureaucratic delays and bottlenecks.

Attractive incentives such as tax reliefs are required in this sub-sector of the economy. The priority that the government has accorded to the food situation should be translated into clear policy incentives for investment in fertilizer production.

Government's participation through investment in the fertilizer industry will be more positive if it encourages full commercialization of the investment without undue interference in the management of the enterprise. This would guarantee prompt payment for the product, where the government is sole buyer in the domestic market. In addition, a policy element is called for in the area of environmental and safety requirements. NAFCON's experience shows that this is important for the efficiency of both plant and personnel. Operational standards are regularly monitored to ensure consistency with internationally determined safety limits for the air, water, and soil as well as the equipment.

A final area of government policy is the structuring of investment pattern or equity participation. NAFCON is a joint venture company owned by the Federal Government of Nigeria as a majority shareholder, while the M. W. Kellogg Company of Houston (Texas), United States of America has Class B shares which do not

attract dividends. Through a Joint Venture Agreement (JVA), the objectives and policies of the company have been clearly articulated. Also contractual payments to the technical partner, M. W. Kellogg Company, are linked by the JVA to a successful implementation schedule. The company's objectives are consistent with the fundamental national goal of self-reliance. This translates into top priorities of self-sufficiency in food production, utilization of natural resources, transfer of technology, enhanced employment opportunities, and integrated development of the rural areas. NAFCON is completely in tune with these aspirations and we are determined to remain a creditable example in the industry.

3. Economic Implications of Fertilizer Specifications[3]

Introduction

This article deals with the economic implications of some fertilizer specifications and highlights some sensitive issues since we will give our opinion on the classification of products that have been subject to commercial contracts in recent times.

I will emphasize that restrictive specifications significantly reduce competition and may contribute to higher purchase prices, but that cost savings are possible. Ultimately, the buyer will decide if the price he has to pay in return for some physical or chemical characteristics is really worthwhile.

Conventional and Specific Products

The various types of fertilizers sold throughout the world can be briefly grouped into two categories: "conventional" products and "specific" products.

The profit margin can, depending on the category of fertilizers, be zero (even negative) or as high as US $55/tonne excluding manufacturing costs. Producers of conventional products make a profit if their plants operate at full capacity and if their production procedures are modern and cost effective. In order to avoid fluctuations in the prices of raw materials, they often establish control over or enter into agreement with oil companies, as well as phosphate and potassium mining enterprises. This policy requires substantial capital and usually involves mergers. Only very large industrial units remain in this business, which is currently undergoing thorough restructuring.

With regard to conventional goods, the products involved are manufactured on a large scale and sold at prices-often low-determined by competition. The price "war" is fierce and sometimes forces producers to sell below cost, thereby defraying only raw material costs and part of the expenses of manufacture. In Europe, the products mainly involved in this "war" are the simple nitrogen fertilizers, PK fertilizers such as 0-20-20 and 0-25-25, and NPKs such as 15-15-15, 13-13-21, 20-20-0, 10-20-20, and 20-10-10, to mention only the main ones.

The period in which competition is most intense is between March and May. It is common, during this period, to see producers sell off their products without a fixed price and with huge discounts. Only an understanding among producers can help to bring the situation under control; however, there are still too many conflicting interests, and above all, the market is very sensitive to cheap imports from east European countries and the United States of America.

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3. Paper presented by Marc André, IFDC-Africa.

The foregoing indicates the insecurity that the major producers of conventional products have to face, and many of them have ceased operations on account of this. It is understandable that producers try to stop producing this range of products if at all possible. But the size of these industries makes them inflexible to formulae changes. A request for a specific formula may only interest the producer if it is meant for large-scale production and especially if the client will collect all his goods in a single consignment. In practice, these conditions are hard to meet.

The production and marketing of special formulae that we refer to as "specific" is an area requiring more flexibility. The capacity of suitable manufacturing tools for the production of small volumes of specific formulae is lower and production generally involves simpler mixing procedures. These producers are often more dependent on the fluctuations on the world commodity prices and carry a much greater liability per tonne.

However, the profit margins shown by these industries are often very good. Unlike prices for general goods, rock-bottom prices do not prevail in this case because the client demands a product manufactured according to specifications and often in a limited quantity. This market is less competitive but requires thorough market research in both sales and marketing.

In the European market, a seller of conventional products manages between 100,000 and 300,000 tonnes per annum with only a telephone, a telex machine, and a secretary. It is, however, rare that the seller of specific products-who visits his distributors as well as the farmers-goes beyond 10,000 tonnes per annum.

If I have discussed extensively the distinction between conventional and specific products, it is because the analysis of the fertilizer market in Africa shows that most imported compound fertilizers are specific, either by their physical aspects or by their chemical composition. The question we must pose is whether the specifications required are economically justified.

Physical Fertilizer Specifications

The physical presentation of fertilizers has serious implications on its production cost. Table 1 provides the production cost per tonne of four different methods of solid fertilizer production.

In order to apply spherical granules of compound fertilizer, each of which contains all the elements of the formula, the user has to pay US $8-22/tonne more than does the user who applies the same quantity of nutrient units-but in the form of blended fertilizer, with each particle containing only one or two elements (bulk blending).

Table 1. Evaluation of NPK (15-15-15) Fertilizer Production Cost[a] (in US $/tonne of bagged product) With Reference to New Installations in Developing Countries That Have a 500 tonne/day Capacity[b]

Method of Production	Fixed Cost		Variable Cost: Raw Materials		Variable Cost: Others		Total
Bulk blending	8	(5%)	139	(87%)	12	(8%)	159
Compaction	21	(13%)	127	(78%)	14	(9%)	162
Steam granulation	25	(15%)	127	(76%)	15	(9%)	167
Chemical granulation	36	(20%)	129	(71%)	16	(9%)	181

a. Evaluation is based on the cost recorded for mid-1988.

b. Schultz, J. J. and Parish, D.H., Fertilizer Production and Supply Constraints and Options in Sub-Sahara Africa, May 1989.

A very large number of farmers throughout the world believe today that the economic advantage of bulk blending is greater than the risk of segregation through bulk handling or application with centrifugal spreading machines. These are the majority of American (70%) and Canadian farmers and a considerable percentage of European farmers. Bulk blending technology has been firmly adopted in England and is making headway in France. The extent of this phenomenon in these countries shows that the problem of segregation does not outweigh the economic benefits of bulk blending. Besides, segregation during transport can be practically controlled by taking certain precautions such as using particles of the same size and density, bagging the product directly after mixing, or partitioning trucks or silos for bulk handling.

Segregation during application is mainly observed when centrifugal spreading machines are used. The extent of mixture separation is insignificant when threaded applicators are used or during manual application. However, a careful study of tenders from most African countries reveals that they completely exclude bulk blending technology because, in the definition of the product, only "compound" or "complex" fertilizers are mentioned. The adoption of this terminology results in the payment of an extra US $8-22/tonne.

In countries within the West African zone alone-excluding Nigeria where the NPK market is about 200,000 tonnes-this option implies an extra payment of some 3 million dollars per annum. To demonstrate this, we have calculated the overall cost of two types of fertilizers commonly used in the zone: the 15-15-15 and the 12-22-12+5S+1B_2O_3. This assessment is based on current raw material prices and those fixed by the Togo Sectorial Import Program under which the EEC is financing the fertilizer scheduled to arrive in Lomé by the end of 1989.

Example 1: 15-15-15 (Compound)

* Purchase price (ordered in June 1989 for delivery in December 1989): $215 bagged c.i.f. Lomé.
* Bulk blending price:

Raw Materials	Quantity	Price	N	P_2O_5	K_2O
DAP ($195/tonne)	0.326 tonne	$63.80	5.9	15	-
SA ($57/tonne)	0.410 tonne	$23.40	8.6	-	-
Urea ($90/tonne)	0.014 tonne	$01.30	0.5	-	-
MOP ($102/tonne)	0.250 tonne	$25.50	-	-	15
	1.000 tonne	$114.00	15	15	15

We add the following to the cost of raw materials ($US 114):

- Mixing costs $US 25
- Bagging costs $US 11
- Transport costs $US 45

This totals $US 195 bagged c.i.f. Lomé.

Conclusion

The conclusion in this case, is that the bulk blending option provides a 9% reduction, i.e., $US 20/tonne.

Example 2: Cotton Formula 12-22-12-5S + 1B_2O_3 (Compound)

* Purchase price (ordered in June for delivery in December 1989): $US 270/tonne.
* Bulk Blending price:

Raw Materials	Quantity	Price	N	P_2O_5	K_2O	B_2O_3
DAP	0.478 tonne	$93.7	8.6	22	-	-
SA	0.162 tonne	$9.2	3.4	-	-	-
MOP	0.200 tonne	$20.4	-	-	12	-
BORAX	0.020 tonne	$8.7	-	-	-	1
LOAD	0.140 tonne	-	-	-	-	-
	1.000 tonne	$132	12	22	12	1

As in the previous example, $US 81 is added to the cost of the raw materials ($US 132), totaling $US 213 bagged c.i.f. Lomé. In this example, the financial gain from bulk blending would be $US 57/tonne (i.e., 21%). From these two examples, we observe that with an ordinary formula like the 15-15-15 the economic advantage of bulk blending is almost 10%, whereas it is over 20% with a specific formula like the 12-22-12+5+1. This difference clearly demonstrates the economic advantage of bulk blending.

Chemical Fertilizer Specifications

A careful study of tenders in the zone clearly shows that those in charge of establishing the chemical specifications of fertilizer have hardly considered the economic implications of such specifications.

We shall examine the cotton formulae,which represent 85% of the bulk of NPK fertilizer consumed in West Africa, with the following breakdown for 1989:

Table 2. Tonnage and Types of Imported Cotton Formulae in West Africa

Benin	15,750	tonnes of 14-23-14+5+1
Burkina Faso	26,000	tonnes of 14-23-14+5+1
Cameroon	11,000	tonnes of 15-20-15+6+1
Côte d'Ivoire	50,000	tonnes of 10-18-18+6+1
Mali	27,000	tonnes of 14-22-12+5+1
Togo	18,000	tonnes of 12-22-12+5+1

Our first observation is that it would definitely be profitable to specify only one formula instead of the first five on the table. When considered separately, they are "specific" formulae, but jointly they make up 100,000 tonnes, a tonnage which can stimulate competition especially if orders are made in a single group tender. In South America, such a fertilizer purchase group, MULTIFERT, has been in existence since 1979; it operates as a limited liability company and makes it possible for its member countries to benefit from the best world prices although individually they represent only a small tonnage. We therefore recommend that member countries of the zone not only standardize their formulas but also seek, with donors, means of making group purchases. If it is the wish of the respective governments, IFDC could help in the establishment of such an international agency.

A second concern is the restriction stipulated in tenders regarding the nature of nitrogen contained in these cotton formulae and also in other NPK formulae for food crops: it has been observed that most tenders specify that nitrogen can only be present in the form of urea or ammonia and all traces of nitrate nitrogen must be excluded.

An investigation has been carried out to determine the basis of this exclusion since it sharply reduces potential competition. Most of the major European producers have industrial procedures based on nitrate nitrogen, always contained in their products. Some of the excluded producers also believe that only commercial implications were taken into account before the restriction; they consider this as agronomically and environmentally unjustified.

In the following discussion, we explain why we believe they are right.

First, it should be understood that after only a few days, nitrogen applied to the soil in the form of urea is transformed into ammoniacal nitrogen (process of ammonification) which in turn is quickly transformed into nitrate nitrogen through a biological process (nitrification).

Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD)[4] reckons that this process does not last for more than three or four days in the tropics due to the high temperatures. The exclusion of nitrate nitrogen seems unjustified. It is not only the soil's composition which determines the uptake. Plants, with very few exceptions (i.e., flooded rice), do not absorb nitrogen at the roots when it is nitrate. Application of nitrogen fertilizers in other forms only delays the functioning of nitrate nitrogen in the plant by a few days. The risk of loss through leaching is equally important.

The leaching of nitrogen actually concerns the nitric form which, whatever the type of fertilizer applied, is still rapidly obtained in the soil. It should also be noted that from a chemical viewpoint, losses through volatilization of urea and ammonia may be great-even up to 60% depending on how deeply fertilizers are placed into the soil. These losses are linked to the abovementioned chemical processes during which ammonia is formed and given off into the air. The risk of loss is zero if nitrate nitrogen is applied.

It should finally be pointed out that urea and ammonia forms are acidic and that some countries like Nigeria, Kenya and Zambia-where the soil is very acidic-cannot even use urea and ammonium sulfate as a source of nitrogen. Therefore, they only import the calcium ammonium nitrate. The exclusion of nitrate fertilizers therefore implies choosing forms which are more acidic and whose effects should be corrected, sooner or later, through the use of limestone.

After consulting a large number of specialists in several different organizations, we recommend that nitrate nitrogen not be excluded from the specification given in tenders; when it is included, the number of producers who can manufacture it competently may increase, thus leading to more competitive prices.

The third point with respect to tenders has to do with the donors, especially the EEC who, in their bid to stimulate the local industry, have included a clause which favors fertilizer producers from African, Caribbean and Pacific (ACP) countries in EEC-financed tenders, a situation that enables the fertilizer producers to capture the market but results in a price increase of 15%. This clause made it possible for one producer in West Africa to monopolize the market for 18,000 tonnes of 12-22-12+5S+1B at the total cost of FCFA 85,000, delivered at the Lomé port.

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4. (21 Annales agronomiques 1955-No 6, p. 977-1033), Jardot D., Doc CIRAD, Fev. 1987.

In Benin, on the other hand, fertilizer is financed by the World Bank, which does not fix preferential prices for ACP producers. Here, the same producer alone offered a lower price (FCFA 72,640 c.i.f. Cotonou) for a formula, 14-23-14-5S+1B, which has a higher nutrient content than the previous one. It was estimated that the formula in Benin, as compared with the same quantity in Togo, was 20% less expensive even though both transactions took place within the same period and were made by the same producer, who took advantage of the generosity of the EEC in an effort to boost local industry. However, because of the clauses on structural adjustment, we are aware that cotton growers do not benefit from subsidies on the fertilizer, which they buy at the c.i.f. price plus the cost of distribution. It is therefore the farmer who bears the cost of the donor's generosity. But is this situation not going to discourage him from producing cotton and thus frustrate the development of the Togolese cotton industry, while helping the industrial development of another country in the region? We would like to draw the attention of the donors to this problem, for they, despite good intent, might unwittingly precipitate problems that conflict with their objectives.

Conclusion

In conclusion, therefore, we suggest that national authorities and donors review their specifications on the physical aspects and chemical composition of fertilizers. As we have seen, the rejection of bulk-blended fertilizer raises the price of each tonne of fertilizer from US $8-$22, and the risk of segregation inside the bags and during manual application is very low. In view of this, we believe that it would be useful to examine this issue thoroughly, showing in a detailed study, the advantages and disadvantages of importing bulk-blended fertilizer.

We have also observed that the ban on nitrate nitrogen is unjustified and that the restriction excludes a good number of major European producers. Finally, we have tried to draw the attention of countries to the benefits of standardizing the cotton formulae and making group orders to reduce purchase prices.

4. The Role of Fertilizer Aid in Fertilizer Supplies in Sub-Saharan Africa: An Analysis[5]

Introduction

Debt crisis and foreign exchange shortages of the 1980s affected several African countries and forced them to reduce imports of all commodities including fertilizers. Hence, many donor programs were initiated to lessen the burden of debt crises on Africa's economic development in general and agricultural development in particular. Because fertilizers play an important role in sustaining growth in agriculture and food production, special attention was paid by many donors to providing support for fertilizer imports. In many African countries, donor-financed fertilizer imports accounted for 100% of fertilizer supply in the mid-1980s.

This paper analyzes the role of fertilizer aid in fertilizer supplies in sub-Saharan Africa. Specifically, it focuses on the following issues:

1. Importance of fertilizer aid in fertilizer supplies in sub-Saharan Africa.
2. Impact of aid-financed fertilizer supplies on fertilizer use in sub-Saharan Africa.
3. Improving the efficiency of fertilizer aid to sub-Saharan Africa.

To understand the importance of fertilizer aid in fertilizer supplies in sub-Saharan Africa, trends in fertilizer use, production, and imports are analyzed. A section on debt crisis and foreign exchange shortages is also included to provide the macroeconomic context for fertilizer aid in sub-Saharan Africa. Thereafter, the issues related to fertilizer aid are discussed.

Trends in Fertilizer Use

Fertilizer use in sub-Saharan Africa increased at 6.3% per annum during the 1970s and 5.5% per annum during the 1980s (1980-1987). However, in 1987/88, total fertilizer use decreased by about 1%. This decrease in total fertilizer use was mostly a result of decrease in nitrogen and potash use, because phosphate use is reported to have increased by about 8%.

This decline in use is mostly a reflection of decreased imports because of foreign exchange shortages faced by many countries. The increased fertilizer prices due to the removal of fertilizer subsidies also affected fertilizer use adversely in some countries.

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5. Paper presented by B. Bumb, Economist, International Fertilizer Development Center.

In spite of these appreciable growth rates of the 1970s and the 1980s, fertilizer use in sub-Saharan Africa is rather low. In 1988, per hectare fertilizer use was only 8 kg, compared with 52 kg in Latin America, 65 kg in North Africa, 87 kg in Asia, and 240 kg in Western Europe. Also, sub-Saharan Africa accounted for only 1% of global fertilizer use in 1987, whereas it had more than 9% of the world population. Among the three nutrients, phosphate use has shown a relatively higher annual growth during the 1970-1988 period. This is perhaps a result of relatively higher use on export crops than on food crops.

Because the food security base of many African countries is fragile,[6] relatively higher growth in fertilizer use will have to be maintained in the 1990s so that per capita food production can be increased.

Supply

The concentration of fertilizer production in a few countries, along with the very small production base, makes sub-Saharan Africa's fertilizer use highly dependent on imports. In 1985/86, more than 90% of the chemical fertilizer used was imported. The range of import dependence varied from 27% in Zimbabwe to 100% in Kenya, Malawi, Cameroon, Burkina Faso, and several other countries (Table 1).

Unlike fertilizer production, which showed little growth between the mid-1970s and the mid-1980s, total fertilizer imports in sub-Saharan Africa grew rapidly from 316,000 tonnes in 1970 to 1,143,000 tonnes in 1986-at a compound rate of 8.0% per annum. Fertilizer imports of individual nutrients also increased significantly: nitrogen imports by 7.8%, phosphate by 8.9%, and potash by 7.6%. Despite this rapid growth, the annual fluctuations in the total as well as nutrientwise fertilizer imports were wide.

What are the factors responsible for such fluctuations in fertilizer imports in sub-Saharan Africa? Are these fluctuations caused by the changes in world prices, by foreign exchange shortages, by poor marketing systems, by droughts, or by the lack of commitment on the part of policymakers? Although a country-level analysis of trends in fertilizer imports might throw some light on this, further research is needed. However, the general slowdown in imports in the early 1980s compared with the 1970s would suggest that foreign exchange shortages and the debt crisis must have played a more important role in this deceleration than the world fertilizer prices because fertilizer prices were generally lower in the 1980s than in the 1970s. Furthermore, many countries were able to use chemical fertilizers in the mid-1980s simply because these were made available through aid.

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6. See World Bank, *"Food Security in Africa"*, unpublished report and FAO Agriculture Toward 2000, Rome, 1987.

To the extent that fertilizer imports are constrained by foreign exchange shortages, fertilizer and other kinds of aid can play an important role in relieving this constraint in the short run. However, the long-run solution may be either in improving the production base or in increasing foreign exchange availability or both.

Future Outlook

Table 2 provides data on projected demand, supply, and supply-demand balances for sub-Saharan Africa in 1994/95. These projections are from IFDC's recent publication entitled Global Fertilizer Perspective, 1960-95: The Dynamics of Growth and Structural Change (Technical Bulletin T-34).

Table 1. Ratio of Fertilizer Imports to Consumption in Sub-Saharan Africa, 1984-86 Average

Country	Average Consumption	Average Imports	Ratio
	----------(nutrient tonnes) ----------		(%)
1. Angola	11,978	12,311	102.8
2. Benin	7,833	8,067	103.0
3. Botswana	1,033	1,033	100.0
4. Burkina Faso	12,168	12,195	100.2
5. Burundi	2,292	2,359	102.9
6. Cameroon	49,833	53,167	106.7
7. Central African Republic	1,518	1,518	100.0
8. Chad	6,633	6,633	100.0
9. Congo	3,067	3,067	100.0
10. Côte d'Ivoire	40,233	57,831	143.7
11. Ethiopia	49,029	58,351	119.0
12. Gabon	2,600	2,600	100.0
13. Gambia	2,300	3,333	119.1
14. Ghana	14,100	14,267	101.2
15. Guinea Bissau	167	167	100.0
16. Guinea	183	183	100.0
17. Kenya	38,481	88,481	100.0
18. Lesotho	4,200	4,200	100.0
19. Liberia	2,533	2,533	100.0
20. Madagascar	10,100	10,100	100.0
21. Malawi	40,592	43,434	107.0
22. Mali	21,600	21,600	100.0
23. Mauritania	997	997	100.0
24. Mauritius	27,398	21,529	78.6
25. Mozambique	7,464	9,432	127.0
26. Niger	2,502	2,502	100.0
27. Nigeria	285,600	318,933	111.7
28. Rwanda	1,233	1,233	100.0
29. Senegal	21,800	17,333	79.5
30. Seychelles	133	133	100.0
31. Sierra Leone	2,030	2,030	100.0
32. Somalia	3,360	1,620	48.2
33. Sudan	58,320	62,920	107.4
34. Swaziland	11,333	9,667	85.3
35. Tanzania	31,745	22,713	71.5
36. Togo	6,587	6,987	106.1
37. Uganda	233	233	100.0
38. Zaire	9,144	9,144	100.0
39. Zambia	67,500	30,876	43.7
40. Zimbabwe	157,033	42,467	27.0

Source: Derived from FAO data.

Table 2. **Sub-Saharan Africa: Fertilizer Outlook, 1995**

	Demand	Supply	Balance
	('000 nutrient tonnes)		
N	950	753	-197
P_2O_5	472	298	-174
K_2O	263	0	-263
	1,685	1,051	-634

Source: IFDC, *Global Fertilizer Perspective*, 1960-95.

From these projections, it is clear that to meet the projected demand, more than 600,000 tonnes of nutrients will have to be imported. Because of no domestic production of potash, all of its potash demand will be met by imports.

The large-scale fertilizer plants in Nigeria, Senegal, and, to a certain extent, Tanzania will make fertilizer production relatively more concentrated in a few countries in the 1990s. Hence at the country level, the dependence on fertilizer imports will further increase. However, the growth of fertilizer production in these countries may promote intra-regional trade.

Debt Crisis and Foreign Exchange Shortages

While the need for fertilizer imports was increasing in the 1980s, the capacity to import fertilizers and other commodities was deteriorating because of increased burdens of debt and debt servicing and decreased export earnings.

Sub-Saharan Africa's long-term public debt increased from US $5.4 billion in 1970 to US $40.8 billion in 1980 and US $ 103.9 billion in 1987. As a percentage of GNP (gross national product), sub-Saharan Africa's long-term debt increased from 13.1% in 1970 to 80.8% in 1987. In many countries, these percentages were between 100% and 200% (Tables 3 and 4).

This rapid increase in debt strained sub-Saharan Africa's foreign exchange resources by increasing the liabilities of debt repayment and interest payments. Interest payments alone on these debts increased from US $0.5 billion in 1970 to US $5.2 billion in 1987. Debt service ratio varied between 3.7% and 59.3% (Table 4).

Table 3. Sub-Saharan Africa: Debt and Debt Service Payments in 1970, 1980, and 1987

Year	US $ Billion	Long-Term Debt as a Percentage of GNP	Interest Payment (US $ billion)	Debt Service Ratio (%)
1970	5.4	13.1	0.5	5
1980	40.8	27.2	1.5	7
1987	103.9	80.8	5.2	14

Source: World Bank, *World Development Report,* various issues.

Table 4. Sub-Saharan Africa: Long-Term Debt, 1970 and 1987[a]

	Million US$		As a Ratio of GNP		Debt Service Ratio[b]	
	1970	1987	1970	1987	1970	1987
			-----(%)----------		(%)----	
Angola	NA	NA	NA	NA	NA	NA
Benin	41	929	15.1	56.5	2.4	15.9
Botswana	17	514	21.2	38.2	1.0	3.7
Burkina Faso	21	794	6.6	44.0	6.8	-
Burundi	7	718	3.1	60.3	2.3	38.5
Cameroon	140	3,306	12.6	27.1	4.0	27.9
Central African Republic	24	520	13.5	49.2	5.1	12.1
Chad	33	270	9.9	28.1	4.2	3.9
Congo	124	3,679	46.5	195.0	11.5	18.6
Côte d'Ivoire	266	11,714	19.5	124.1	7.5	40.8
Ethiopia	169	2,434	9.5	45.6	11.4	28.4
Gabon	91	1,605	28.8	52.5	5.7	5.1
Gambia	NA	NA	NA	NA	NA	NA
Ghana	498	2,237	22.5	45.3	5.5	20.3
Guinea Bissau	NA	NA	NA	NA	NA	NA
Guinea	312	1,617	NA	NA	12.1	59.3
Kenya	406	4,978	26.3	64.3	9.1	33.8
Lesotho	8	237	7.7	37.1	4.5	4.4
Liberia	158	1,152	39.2	108.4	8.1	2.5
Madagascar	89	3,114	10.4	163.2	3.7	35.3
Malawi	122	1,155	43.2	98.3	7.8	23.3
Mali	238	1,847	71.4	95.7	1.4	9.9
Mauritania	27	1,868	13.9	215.1	3.4	18.2

(Continued)

Table 4. Sub-Saharan Africa: Long-Term Debt, 1970 and 1987[a] (Continued)

	Million US$		As a Ratio of GNP		Debt Service Ratio[b]	
	1970	1987	1970	1987	1970	1987
			(%)		(%)	
Mauritius	32	591	14.3	34.1	NA	NA
Mozambique	NA	NA	NA	NA	NA	NA
Niger	NA	1,513	NA	72.6	NA	46.9
Nigeria	567	26,057	4.3	111.3	7.1	11.7
Rwanda	2	544	0.9	26.1	1.2	11.3
Senegal	131	3,109	15.5	69.2	4.0	22.3
Seychelles	NA	NA	NA	NA	NA	NA
Sierra Leone	59	513	14.3	54.6	10.8	-
Somalia	77	2,288	24.4	236.9	2.1	8.3
Sudan	NA	8,248	NA	101.9	NA	NA
Swaziland	NA	NA	NA	NA	NA	NA
Tanzania	265	4,079	20.7	144.1	6.3	19.2
Togo	40	1,042	16.0	90.6	3.1	14.2
Uganda	138	1,116	7.3	29.7	2.9	19.5
Zaire	311	7,334	9.1	139.5	4.4	12.8
Zambia	653	4,354	37.5	227.5	NA	NA
Zimbabwe	-	2,095	NA	37.1	NA	NA

a. NA = Not available.

b. Ratio of debt repayment and interest charges to exports of goods and services.

Source: World Bank, *World Development Report, 1989.*

While the debt service payments increased rapidly, the capacity to earn foreign exchange decreased. Sub-Saharan Africa's exports decreased at 1% per annum during the 1980-87 period. The decreasing commodity and oil prices were responsible for this deceleration in export growth. Consequently, the foreign exchange crisis deepened. Because of increasing debt service obligations and decreasing export earnings, net capital inflow to sub-Saharan Africa also decreased during the 1980s from US $ 7.5 billion in 1980 to US $5.0 billion in 1987.

Fertilizer Aid

An increasing need for fertilizer imports and a decreasing capacity to import fertilizers and other commodities due to debt crises and foreign exchange shortages made sub-Saharan African countries increasingly dependent on fertilizer aid. Several countries could sustain growth in fertilizer use simply because fertilizer imports could be financed through donor-supported programs. Even an oil-exporting country like Nigeria had to rely on massive World Bank loans in 1983 to finance its fertilizer imports during the 1983-86 period.

Table 5. Fertilizer Aid, 1985-87

Year	Product	Nutrient	Ratio of Nutrient to Product
	-------('000 tonnes) ------		(%)
1985	1,680	716	43
1986	906	407	45
1987	698	314	45

Source: Fertilizer Economic Studies, Limited (FERTCON), 1989.

Table 5 provides data on fertilizer imports by sub-Saharan African countries financed through fertilizer aid[7]. In 1985, about 716,000 tonnes of nutrients and 1,680,000 tonnes of products were provided through fertilizer aid. However, fertilizer aid dropped by more than 50% in 1987.

In 1985, 75% of nitrogen imports were financed through aid. Likewise, donor-supported programs financed 63% of P_2O_5 and 41% of K_2O imports.

In 1986 and 1987, the ratio of aid-financed fertilizers to total fertilizer imports decreased because some of the large countries did not use aid for fertilizer imports. A notable example is Nigeria, whose dependence on aid decreased from 100% in 1985 to 0% in 1987 because the World Bank's fertilizer import loan was closed in 1986. However, for many other countries, the dependence on fertilizer aid remained high. For example, in Burkina Faso, Chad, Central African Republic, Congo, Gabon, Guinea, Madagascar, Mali, Rwanda, Togo, Uganda, and Zaire, all fertilizer imports were financed through aid. In other countries like Ghana, Tanzania, and Gambia, fertilizer aid accounted for a larger share of their fertilizer imports (Table 6).

At the country level, the dependence on fertilizer aid was relatively higher. For 20-30 countries all fertilizer imports were funded through donor programs. Another eight countries received donor funding of 50% to 90% of their fertilizer imports. Thus, 30 of the 40 countries in sub-Saharan Africa were dependent on aid for the major share of their fertilizer imports (Table 7).

7. All data in this section refer to calendar years. Hence, these are not strictly comparable with FAO data on imports reported earlier.

Table 6. Sub-Saharan Africa: Ratio of Aid-Financed Fertilizers in Total Imports 1985-87

	1985	1986	1987
		(%)	
Angola	50	24	8
Benin	100	54	26
Botswana	0	0	0
Burkina Faso	100	100	100
Burundi	100	97	70
Cameroon	2	0	0
Central African Republic	100	100	100
Chad	100	64	100
Congo	100	100	100
Côte d'Ivoire	0	0	0
Equatorial Guinea	100	100	100
Ethiopia	27	6	13
Gabon	100	100	100
Gambia	100	64	82
Ghana	67	100	91
Guinea Bissau	100	100	100
Guinea	100	100	100
Kenya	32	17	53
Lesotho	0	0	77
Liberia	13	100	66
Madagascar	100	100	100
Malawi	16	38	
Mali	100	100	100
Mauritania	100	100	100
Mauritius	0	0	0
Mozambique	91	100	100
Niger	100	100	100
Nigeria	100	100	0
Rwanda	100	100	100
Senegal	0	0	0
Sierra Leone	100	100	100
Somalia	100	100	100
Sudan	100	100	100
Swaziland	0	0	0
Tanzania	80	97	68
Togo	100	100	100
Uganda	100	100	100
Zaire	100	100	100
Zambia	0	0	0
Zimbabwe	57	80	55
Sub-Saharan Africa	65	49	30

Source: Fertilizer Economic Studies, Limited (FERTECON), 1989.

Table 7. Distribution of Countries by the Ratio of Fertilizer Aid to Fertilizer Imports, 1985-87

Ratio	Number of Countries		
	1985	1986	1987
(%)			
0	7	8	8
1-20	3	3	4
20-50	2	1	1
50-80	3	3	5
80-99	2	3	2
100	23	22	20
	40	40	40

Source: Derived from FERTECON data.

Consequences of Fertilizer Aid

Because many countries suffered from debt crisis and foreign exchange shortages during the mid-1980s, fertilizer aid played an important role in maintaining growth in fertilizer use in sub-Saharan Africa. However, aid-financed fertilizers do not come without strings. Many donors attach conditions to fertilizer aid. These conditions can be divided into three broad groups:

1. Policy conditionality.
2. Product conditionality.
3. Other conditions.

Before we analyze these conditions in detail, it is important to identify different categories of fertilizer aid. Broadly, two groups of fertilizer aid can be identified:

1. Foreign exchange (for importing fertilizers).
2. Commodity aid/aid-in-kind.

Any of these import support programs can be commercial loans, soft loans, or grants. When foreign exchange is provided for importing fertilizers, this can come either as a balance of payment support or as a structural adjustment loan. This kind of aid can come either from multilateral agencies or from bilateral agencies. Both multilateral and bilateral foreign exchange support will have some conditions attached to the use of funds in purchasing fertilizers.

The multilateral agencies attach policy conditionality like the removal of fertilizer subsidies, privatization of operations in the fertilizer sector, the use of International Competitive Bidding (ICB) among member countries, and others. Generally, the use of ICB helps in reducing the cost of fertilizer imports. The implementation experience of the fertilizer import loan to Nigeria by the World Bank indicates that cost of importing fertilizers was much lower under ICB than under non-ICB procedures. The estimates of cost savings range from 10% to 30%.

The bilateral donor agencies like United States Agency for International Development (USAID), Norwegian Agency for International Development (NORAD), and others may specify certain conditions like import of fertilizers from their own country, the use of their shipping vessels, and others. These conditions increase the cost of fertilizer imports to the recipient country. It is estimated that the total effect of all these conditions may more than double the cost of aid-financed fertilizers compared with what the country could import through free foreign exchange in international markets.

When donors provide commodity aid, usually the motivation is to dispose of surplus commodity in the donor country. Although this kind of aid can be useful and can be made available rather quickly, because no time is lost in tendering and other procedural arrangements, there are two problems. First, the surplus commodity in the donor country may not meet the fertilizer requirements of the recipient country. Second, the recipient has no leverage in negotiating the price. Hence, the commodity aid can become very costly.

Although fertilizer grants are free of charge, they may suffer from mismatch of products for the recipient's needs. If not properly managed, they may disrupt the distribution of commercial fertilizers.

To improve the efficiency of aid fertilizers, the following steps should be used.

First, efforts should be made by the recipient country to allocate relatively more foreign exchange for their imports of fertilizers.

Second, efforts should be made to negotiate availability of foreign exchange for imports of fertilizer.

Third, to maximize the benefits of the commodity aid, the recipient country should identify its agronomic needs much more carefully and accept only those products that are suitable for the country's soil needs and cropping patterns.

Fourth, the donors should impose minimal conditions on fertilizer import loans. Sometimes the policy conditionality may prove counterproductive. The conditions that provide cost-effective fertilizers should be identified and encouraged.

Fifth, the local funds or counterpart funds should be made available on time, so that donor-financed fertilizers can be distributed on time.

Sixth, the arrangements for internal distribution of aid-financed fertilizers should be improved. Allowing grant fertilizers to stay at the port, as has sometimes happened, leads to tremendous wastage.

Seventh, a proper pricing policy should be formulated so that grant fertilizers do not destroy the market for commercial imports and jeopardize the privatization process.

5. Problems Experienced With Fertilizer Imports Financed Under Aid: Recipient Point of View

5.1. The Case of Ghana[8]

Background

The agricultural sector continues to account for roughly 50% of Ghana's Gross Domestic Product (GDP) and close to 70% of its merchandise exports, and it employs 66% of the labor force. Ghana has the potential to use its agriculture as the basis for economic growth and development given its immense agricultural resource base, a large and potentially competitive industrial capacity, a relatively well developed human resource base and an abundant supply of cheap hydroelectric power (1,070 megawatts).

In spite of this potential, a continuous decline in per capita income after the early 1960s increased the incidence of absolute poverty, worsened income distribution, and reduced efforts at alleviation of poverty, which had its major roots in the decline in agricultural output. This reduction in agricultural output in turn was a result of policy choices that were made from misdiagnosis of alleged market imperfections in both factor and product markets and thus resulted in policy-induced domestic distortions inimical to growth, equity, and poverty alleviation. Under public sector management, input distribution grew increasingly inefficient. In addition, agricultural producer incentives worsened as agricultural taxation (especially in the industrial crop sector) increased. Producers responded either by smuggling output into neighboring countries for sale (cocoa) or by reducing acreages; in 1983 cotton production was 25% of its average in 1975-77, while tobacco production was 20% of its average level in 1974-75.

Agricultural growth has been renewed under the Economic Recovery Program (ERP), benefitting most immediately from realignment of the exchange rate, improved transport infrastructure, increases in the producer price of cocoa, greater access to fertilizer through increased imports and also from a period of adequate rainfall.

Agricultural Growth Potential

Growth will come from three main sources: (i) increase in the cultivated area and labor input as a result of population growth in the rural areas; (ii) increase in the yield of rainfed crops as a result of modern inputs such as yield-increasing varieties and fertilizers; and (iii) increase in production by bringing more area under irrigation.

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8. Paper presented by Dr. S. K. Dapaah, Director, Policy Planning, Monitoring and Evaluation Department, Ministry of Agriculture.

Constraints to Increased Agricultural Production

Declining levels of soil fertility, the scarcity of manpower to undertake land preparation, and the problems of pests and diseases are among the constraints to increased agricultural production. In the context of this paper, the soil fertility problem was highlighted.

Soil Fertility

Because of the low inherent fertility of many Ghanaian soils, the future decline in the fallow period, and the increase in areas of continuously cropped land, soil fertility will be an important constraint to future crop production unless new methods of maintaining fertility can be successfully adopted by farmers.

To provide the total amount of nitrogen removed by the crops in a single year would require the equivalent of about 332,000 tonnes of ammonium sulfate, and to provide the phosphate would require about 116,000 tonnes of single superphosphate, or 330,000 tonnes of 15:15:15 compound fertilizer. Total fertilizer imports to Ghana in 1988 amounted to about 50,000 tonnes.

Application of chemical fertilizers is the most common method of maintaining soil fertility and, provided the fertilizer can be made available in timely fashion, is an effective means of replacing the soil nutrients removed by a crop.

Farm Support Services

Input Supply and Distribution-There is a very limited supply of certified cereal **seed** in Ghana and little or no supply of certified planting material for root crops, which is a major constraint.

Fertilizers-In many parts of Ghana, increases in crop production are dependent on increased use of fertilizers; as discussed earlier, this is likely to become more essential in the future.

The fertilizer availability and distribution program is on track this year (1989/90). For the first time in Ghana's recent agricultural history, fertilizer arrived in the country in January. The privatization program is also proceeding, and in some places where privatization has not begun officially, some traders are already retailing fertilizer. However, careful planning and monitoring for a sustained fertilizer importation and distribution system is still required.

Marketing and Storage-To sustain the momentum of farmers in increased agricultural production, there must be adequate marketing facilities that ensure remunerative returns on the activities. At harvest time there is an abundant supply of produce, and prices fall drastically to the extent that farmers may not cover production costs. There is a need to store some harvested

produce as a price and income stabilization measure. The Ghana Food Distribution Corporation (GFDC), which handles less than 8% of the marketable surplus, has about 50,000 tonnes of storage space for food grains. This is inadequate to handle the nearly 400,000 tonnes of maize that is marketed every year.

Medium-Term Strategy (1990-95)

The major agricultural development objective of the government in the 1990s is to "pursue a demand-driven national agricultural strategy whose goals are development oriented, productivity enhancing, and competitiveness promoting." In particular, the goals for the medium term are to:

1. Provide all Ghanaians with **food security** by way of adequate and nutritionally balanced diets at affordable prices.

2. Agriculture provides **employment** directly for at least two-thirds of the working population and its share in total employment continues to rise.

3. Increase foreign exchange earnings by increasing the production of traditional agricultural exports and diversifying into other non-traditional exports as well as increasing the production of import substitutes.

4. Promote resource-based industrial production.

5. Promote balanced regional development.

Input Supply System

The main issue of input supply centers is to import and distribute fertilizer. Because of the scarcity of fertilizers due to foreign exchange shortages and the burden on public finances due to subsidies on the fertilizers, the Ministry of Agriculture (MOA) has been responsible for determining annual fertilizer requirements (provisioning) and for importing and distributing fertilizers. There is no local production of fertilizers in Ghana.

The Crop Services Department (CSD) of the MOA has in the past determined annual fertilizer requirements from consumption estimates submitted by MOA regional offices and the Farmers Services Companies (FASCOM) operating in the Volta and Upper East and West regions. The actual quantities of fertilizers to be imported are determined by the amount of foreign exchange allocated for the regions according to requirement submittals, taking into account historical use patterns and inventory positions.

The procurement of fertilizer is undertaken by the Crown Agents (CA) acting on behalf of the Bank of Ghana (BOG) in respect of the International Development Association (IDA) and certain other donor-aided import programs. In other cases the fertilizer is imported by the Ghana National Procurement Agency (GNPA) on behalf of the MOA.

With the establishment of Government-owned FASCOMs, fertilizer distribution has been transferred from the MOA to these companies in the Upper East, Upper West, and Volta Regions. In all the other regions, the MOA continues to be responsible for fertilizer distribution. Delays in importation, transportation, and distribution of fertilizers have been common problems over the past years.

Fertilizer is imported in bagged form through the Port of Tema. Poor port conditions limit vessel unloading rates. A port improvement program under the " Ports Rehabilitation Project (Tema and Takoradi) financed by the World Bank, Saudi Fund, and European Development Fund (EDF) is currently underway.

Fertilizer is discharged from vessels directly onto trucks for haulage to MOA national warehouses at Tema and Swedru and to MOA regional and district depots from the State Transport Corporation (STC), and private truckers are hired for this purpose. The FASCOMs do most of their own trucking.

Road transport is the predominant mode of moving fertilizer from the port to inland depots. Only limited use has been made of rail transport because few, if any, of MOA storage depots are located on rail lines. Inland water transport via Lake Volta and connecting rivers is also developed, and additional barge capacity has been added.

With few exceptions, road conditions are poor, particularly in the rural areas, adding to transport time and wear and tear on vehicles. The use of large-capacity trucks is usually restricted to delivering to regional and district level depots; smaller trucks are used for deliveries to village-level sales points. Because of the poor state of the roads, private truckers are reluctant, and often refuse, to undertake trucking in the rural areas. This is particularly problematic in the more remote areas since the MOA has little transport facility of its own.

Policy-makers in Ghana believe that chemical fertilizers can, in combination with other measures, definitely play a crucial role in increasing agricultural production. They have indicated time and time again that they prefer agricultural inputs to food aid, and fertilizer happens to be one of the most important agricultural inputs for increasing agricultural productivity.

Unfortunately an unfavorable balance of payment, as well as high debt servicing, severely limits Ghana's ability to import adequate quantities of fertilizers. For these and other reasons, Ghana has opted for the increasing use of fertilizer aid in the form of loans on concessional terms or grants from bilateral and multilateral donors and agencies.

These concessional fertilizer loans and grants come in the following form:

1. Balance of payment support, thus making foreign exchange available to Ghana to enable it to import fertilizer either from the donor country or other countries.

2. Budgetary support to Ghana to develop its agriculture. In this particular case, the local proceeds from the sale of the fertilizer are put in a counterpart fund account to be used for projects and programs agreed to by both donor and recipient.

Several reasons have been advanced to indicate the aims and objectives of fertilizer loans. These include:

1. Making loans and grants available to recipient countries to help local farmers to understand the value and proper use of fertilizer, thereby helping to increase agricultural productivity and incomes and achieving improved food security.

2. Enabling the recipient countries to use their own foreign exchange resources in acquiring other imports for the general development of the country.

3. Enabling suppliers from fertilizer-producing countries to have access to new markets.

4. Maintaining employment levels in the donor country.

5. Using aid fertilizer to introduce different types of fertilizer in recipient countries.

Since 1983 all fertilizer imports have been on concessional terms from bilateral and multilateral sources. In 1988, this amounted to 50,000 tonnes of various types of fertilizers from several sources.

Problems That Have Occurred While Executing Loans and Grants

A major problem that has arisen while executing loans and grants for fertilizer has been the different procedures adopted by bilateral and multilateral donors and agencies. Most often the negotiation prior to the supply of the fertilizer can be cumbersome and time consuming, involving many hours of the recipient officials' time which could have been used on other activities.

Negotiations could involve several Government institutions, agencies, and the Central Bank.

Most often recipient countries such as Ghana spend considerable time with donor agencies on the conditionalities insisted upon by donors, some of which are enumerated below:

1. Procurement Agents-Some bilateral agencies insist on the appointment of procurement agents although recipient countries

may have procedures or experience in procurement of fertilizer. Invariably the external procurement agency appointed is paid from the loan thereby reducing the fertilizer which should be made available from the loan. A case in point is the insistence of a multilateral donor on the appointment of an external procurement agency, which delayed the supply of fertilizer to Ghana for almost a year although the local authorities had gone through a procurement procedure for the fertilizer based on International Competitive Bidding. The authorities could not award the contract early because the donor insisted that, although they did not see anything wrong with the local procurement procedures adopted, their regulations preferred procurement by an external agent. After high-level negotiations, the donor agency agreed with the authorities, but the supply of the fertilizer was delayed by a year.

2. Source of Fertilizer-The procurement of fertilizer is always tied to a source. For example, bilateral donors often insist on the imports from their countries and multilaterals on imports from member countries of the institutions. In most cases, the source available costs more than other sources, thereby defeating the purpose of making fertilizer available to the recipient country at competitive prices to enable small-scale farmers to apply fertilizers.

   For example, in 1987 Ghana took delivery of 1,000 tonnes sulfate of ammonia and 869 tonnes NPK 20:20:0 from a donor country. The value of the consignment on c.i.f. basis converted at the Cedi value of the dollar was C121,669,990. But at the prevailing selling prices at the time, proceeds fetched only C41,679,000, leaving a difference of C79,890,390.

3. Type of Fertilizer-The type of fertilizer is determined to a large extent by recipient countries, but where a particular donor does not have the type demanded, the recipient may be forced to accept what is available. This constraint refers mostly to bilateral donors. In a recent grant of fertilizer to Ghana, the Government wanted 15-15-15; however, because the donor did not have this particular type and had only 17-17-17, the recipient country had to take this formulation after a prolonged negotiation.

4. Timing of Supply-The financial year of donors influences the timing of availability of fertilizers; sometimes, therefore, fertilizers arrive at a time when they are not really needed.

In conclusion, official policy in Ghana recognizes the pivotal role chemical fertilizers can play in Ghana's quest for increased agricultural productivity. It also recognizes that there are substantial savings to be made in terms of cheaper prices and simple procurement procedures if Ghana could procure fertilizers from the cheapest source available and at the most opportune times. These savings, in some cases, could provide as much as 40% reduction in costs.

The truth, however, is that Ghana does not produce any fertilizers and due to balance of payment problems is unable to import all her fertilizer requirements from her own resources. Given this situation Ghana has increasingly depended on fertilizer aid from a variety of sources to meet her domestic demand.

In spite of the various misgivings and problems associated with fertilizer aid, Ghana continues to reap substantial benefits from such aid and grants. It is official policy that fertilizer aid and other input aid are definitely preferable to food aid, which creates an even worse type of dependence. That donor fertilizer aid is beneficial to most recipient countries can be seen from the fact that the 200,000 tonnes of Dutch fertilizer given as aid in 1983 to India, Pakistan, Bangladesh, Sri Lanka, Tanzania, and Kenya at the cost of approximately US $50 million is estimated to have saved these countries an equivalent of 2.6 million tonnes of grains valued at over US $500 million.

There is therefore no doubt that fertilizer aid benefits both donors and recipients in one way or the other, and the chances are that this type of aid will increase in importance rather than decrease as fertilizer use in Africa increases from the 3-9 kg/ha to rates prevailing in other developing countries. The real challenge in the future is determining how both donors and recipients can work together to eliminate the obstacles that prevent them from obtaining full benefits for their people.

5.2. The Case of the Peoples' Republic of Benin[9]

Introduction

Benin is one of the 26 least developed African countries; its economy is based on agriculture. This sector generates most foreign exchange through the export of cotton, palm oil, coffee, and other products. Total population amounts to 4 million, with an annual growth rate of 2.7%. The focus of the agricultural policy is to maintain self-sufficiency in food production and to generate foreign exchange. To attain these goals, Benin needs to increase agricultural production through higher levels of fertilizer use. However, the foreign exchange to procure fertilizer is not available, and therefore Benin has requested foreign assistance for this purpose.

Justification for Loans from the Policy Point of View

Foreign assistance to Benin is both bilateral and multilateral, e.g., World Bank and Organisation of Petroleum Exporting Countries (OPEC), and it may consist of financial aid, a credit line, or aid-in-kind.

An example of a bilateral aid project is assistance provided by Kredit Anstalt fur Wiederaufbauw (KFW), Federal Republic of Germany, (FRG) in improving food production and manpower development in the Centre d'Action Regional pour le Developpement Rural (CARDER) Atlantique. Fertilizer for this project is purchased and distributed by Societe Nationale pour le Promotion Agricole (SONAPRA). The countervalue of the fertilizer flows back to the project. The Government of Japan has a similar program in Benin.

As a multilateral agency, the World Bank finances a rural development project in the Borgou province, which concentrates mainly, but not exclusively, on cotton. In this instance also, SONAPRA handles the fertilizer import.

Objectives of the Loans

The objective of the loans is to provide balance of payments support: the World Bank financed the import of 7,000 tonnes of 14-23-14+5S+1B, and the Federal Republic of Germany donated 4,500 tonnes of urea.

Why Are Fertilizers Included in Aid Packages?

Fertilizer use in developing countries is low, and as a result, soil fertility declines and subsequently yields diminish. The use of fertilizers has to be increased in order to improve agricultural productivity, increase farmers' income, and reach the goal of food self-sufficiency.

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9. Tabé, Boni Gado, SONAPRA, Benin

Fertilizer Import

Benin normally procures the following types of fertilizers 14-23-14+5S+1B, urea, diammonium phosphate (DAP), triple superphosphate (TSP), sulfate of potassium (SOP), ammonium sulfate (AS), bicalcium phosphate, and magnesium sulfate. Table 1 provides an evolution of the imports.

Table 1. Fertilizer Import in Benin (1980/81-1989/90)

Year	Volume	Value	Aid Financed	Source
	(tonnes product)	(million FCFA)	(%)	
1980/81	4,870	323		
1981/82	3,794	316		
1982/83	11,674	1,006		IDA
1983/84	10,745	983	52	IFAD[a]
1984/85	15,874	1,440	58	OPEC
1985/86	20,440	2,246	42	CCCE[b]
1986/87	20,535	1,537	22	
1987/88	8,471	1,440	11	
1988/89	14,139	1,043	n.a	
1989/90	12,250	804	90	World Bank/KFW/CCCE

a. International Fund for Agricultural Development.
b. Caisse Central de Cooperation Economique.
Source: SONAPRA

Problems Encountered

Among the problems that arise with fertilizer procurement financed by foreign assistance can be mentioned administrative delays, long negotiation procedures with the donor, and conditions attached to the assistance, i.e., tied loans.

Attaching conditions has often led to a higher import price when fertilizer is procured under bilateral aid as compared with procurement by international tender in the case of World Bank loans (Table 2).

Concluding Remarks

Notwithstanding the problems experienced in importing fertilizer under financial arrangements between Benin and friendly nations or multilateral agencies, it remains a fact that fertilizers are indispensable and that the assistance is highly appreciated. Without this essential input, agricultural production cannot be increased.

Table 2. Comparison of Cotton Fertilizer Imports Financed by Japan and World Bank/SONAPRA

	Source of Finance				
	Japan		World Bank/SONAPRA		
Year	Volume (tonnes)	Price CIF/tonne (FCFA)	Volume (tonnes)	Price CIF/tonne (FCFA)	Price Difference (%)
			14-23-14+5S+1B		
1986/87	3,500	122,250	12,700	100,500	+17.4
1987/88	1,464	196,104	11,200	66,233	+154.7
1988/89	600	166,123	12,000	64,676	+169.0
			Urea		
1986/87	1,500	98,275	5,100	63,500	+57.4
1987/88	856	158,215	2,400	36,430	+205.9

Source: SONAPRA.

6. Problems Experienced With Fertilizer Assistance:

Viewpoints of Donors: The Netherlands[10]

Introduction

The Netherlands Government's policy on development cooperation follows a two-pronged approach. First, it aims at supporting the economic independence (self-reliance) of developing countries. Second, Dutch aid programs aim to alleviate the fate of the poorest groups. These goals are thus directed at supporting economic development, but it is recognized that special interventions will be necessary to make sure that the poorest sections of the populations also benefit from development rather than be marginalised. Both considerations play a role in fertilizer aid.

Fertilizer Aid programme

Fertilizer aid is donated in the context of balance of payments support programmes, which are part of bilateral aid programmes with priority countries and regions. Recipient countries of fertilizer aid in Africa have been Egypt in Northern Africa, Sudan, Kenya, Tanzania, Burundi and Zambia in Eastern and Southern Africa and Mauretania, Mali, Burkina Faso, Niger, Chad and Ghana in West Africa. The fertilizer aid to Africa is all financed from grants. The total disbursements for fertilizer aid were on average 280 million Guilders (NLG) annually from 1981 to 1984, and decreased subsequently to 180 million NLG from 1985 to 1988, (2 NLG are approx. equal to 1 USD). The regional focus shifted from Asian countries to Africa. The share of West Africa in particular went up subsequently (Table 1).

Table 1. Percentage breakdown of Netherlands fertilizer aid by region

	Period	
	1981-1984	1985-1988
Average annual disbursements in million NLG	280	180
Percentage share of recipient countries in :		
Asia	76	60
West Africa	2	14
Eastern and Southern Africa	17	22
Latin America	5	4
Total	100	100

Source : DGIS

10. Jaap van Driel, LEI. Mr. van Driel is an agricultural economist who, as consultant to the Ministry for Development Cooperation, has appraised requests for fertilizer aid and has evaluated aid programs to several countries.

Straight nitrogen fertilizers constitute the major par of the fertilizers supplied under Netherlands aid (Table 2), the most important being Urea and Calcium Ammonium Nitrate. NPK compounds are the second main type.

Table 2. Percentage breakdown of Netherlands fertilizer aid over 1985-1989 by type of fertilizer [1]

Type	Percentage	Share
Straight N fertilizers	76	
of which :		
Ammonium Nitrate		1
Sulphate of Ammonia		5
Calcium Ammonium Nitrate		19
Urea		51
Straight P fertilizers	1	
Straight K fertilizers	-	
NP compounds	2	
NPK compounds	21	
Total	100	(=1 million tons)

Source : VIB

[1] Fertilizr procured by VIB, the Netherlands' Government Agency which procures about half of the total aid fertilizer. The remainder is procured by recipient countries' own agencies.

Scope

In the first instance, fertilizer aid is a form of support to the balance of payments of the recipient country. Fertilizer aid dates from the first oil crisis when fertilizer prices, particularly those of nitrogenous fertilizers, suddenly went sky high and the oil import bill became a heavy burden on the balance of payments of many energy-deficient developing countries. Fertilizer prices went down again in the 1980s, but balance of payments problems remained a constraint to the importation of fertilizers in the required quantities in many countries. So fertilizer aid is a means to secure the availability of fertilizers at the national level thereby freeing foreign exchange for the importation of other commodities. For the government of the recipient country, the funds resulting from the sale of the fertilizers constitute support to the government budget. Only in a few cases have conditions been imposed on the use of those funds for specific projects.

It is mutually agreed between the recipient country and the Netherlands Government which commodities will be imported under the balance of payments support program. The choice for fertilizer means combining general economic support to the balance of payments and the government budget with targeting the aid to the agricultural sector to secure the availability of an essential input for agricultural production. Fertilizer is not only

needed to increase agricultural production and food supply in the short run, particularly in the semi-arid zone of West Africa, but it is also an indispensable component of a strategy of intensification of agricultural production. Such a strategy is required in order to develop a sustainable agricultural system. In this system, an optimum use of organic materials such as the recycling of crop residues and manure has to go along with the use of mineral fertilizer. Continuation of the present extensive farming systems in this region would lead to over-exploitation and deterioration of natural resources, including soil fertility. This is already visible in many countries.

The Netherlands policy in fact goes further than the sector level and also considers the micro level by including food crops and small farmers as the sector and target group that should in particular benefit from the fertilizer aid. There is already a problem: how can we assure an intervention at the national level to favor a particular target group?

Within the domain of fertilizer supply, it is also the policy of the Netherlands Government to support the development of local fertilizer resources in developing countries. This includes in Africa the utilization of local phosphates, bagging and (bulk) blending, and the manufacture of fertilizers. Fertilizer aid should not compete with local fertilizers. To this end, most fertilizer aid of the Netherlands is partially untied; the fertilizer will be procured by international tender. Both fertilizers of Netherlands origin and those manufactured in developing countries are eligible. Of the fertilizer aid to Asian countries, a substantial part is supplied by other than Dutch fertilizer manufacturers. This is not (yet) the case of the fertilizer aid to Africa (Table 3).

Table 3. Percentage breakdown of Netherlands fertilizer aid [1] over 1985-1989 by countries of origin and recipient countries grouped into major regions

Countries of origin	Recipient countries in :				
	West Africa	Eastern and Southern Africa	Asia	Latin America	Total
The Netherlands	68	78	27	31	61
North Africa	-	-	-	52	2
West Africa	27	3	-	-	9
Southern Africa	-	2	-	-	1
Middle East[2]	1	17	-	-	8
South and Far East	-	-	73	-	18
Latin America	4	-	-	17	1
Total	100	100	100	100	100
Total CIF value in million NLG	108	200	104	14	426

Source : VIB
[1] See note [1] to table 2,
[2] Include Near East.

Estimation of Demand

The estimation of effective demand for a particular type of fertilizer is generally difficult. Little information is systematically collected on fertilizer use, and sales or deliveries from wholesale to retail level are often taken as consumption. On top of that, past consumption levels may not be a true reflection of effective demand because of bottlenecks in the delivery system. In that case, part of effective demand has not been met and actual consumption has been lower than effective demand.

Distribution Problems

Making fertilizer available at the national level does not always imply that fertilizers will be effectively available to farmers at the right time. There may be bottlenecks in the distribution system due to poor infrastructure: bad roads, lack of transport capacity, and the fact that fertilizers have to compete with other goods for transport capacity. It is not always sufficiently appreciated that the period for application of fertilizers is often very short. Application after the optimum period may render fertilizer use unattractive or even harmful for crop growth.

Price control can be a disincentive to fertilizer dealers to serve remote areas. Prices of fertilizer to farmers are often administered by the government, not only in state or parastatal distribution systems, but also in countries with a partially or fully privatized fertilizer delivery system. The rationale that is mostly given is the protection of the small farmer against exploitation by traders. The result may well be that trade margins are so small that distributors abstain from serving remote areas; subsequently farmers in those areas suffer.

Lack of Effective Demand

To the farmer, fertilizer use is only attractive if there is a reasonably secure market for his additional production at a remunerative price. In order to obtain a sufficient level of profitability, he may need complementary inputs like seeds of improved varieties and agrochemicals to protect the more exuberantly growing crop against pests and diseases. Fertilizer use also requires additional labor for weed control and harvesting. There is further the problem of production risks. The farmer must have reasonable security of sufficient rainfall or a guaranteed supply of irrigation water. Even if he is willing to use fertilizer, the farmer may lack the money to buy fertilizer and other inputs, so unless he can obtain a seasonal loan, he will not be able to buy fertilizer. Another constraint is that farmers may be risk averse and may not be fully aware of how to use fertilizer and the benefits of it. Constraints such as these cause a lack of effective demand for fertilizers. These problems are particularly prevalent with respect to food crops.

Development of Regional and Domestic Supply

The import of fertilizer can be diminished by developing local resources. Africa is rich in phosphate, and countries like Nigeria have low-cost energy supplies for the production of nitrogenous fertilizers. These resources are still not utilized to their full potential. It is the experience of Netherlands fertilizer aid to Africa that it is apparently hard for African producers to win tenders in the procurement procedure for Netherlands fertilizer aid programs. Perhaps African countries when formulating specifications for the fertilizer to be imported under Netherlands aid should take into consideration the specifications of the fertilizers actually produced by other African countries. (See also the contribution by M. André on fertilizer specification).

Adjustment to Privatization of Fertilizer Distribution

In countries that have advanced towards privatization of fertilizer importation and distribution, fertilizer aid-in-kind will make the government a competitor with private enterprises. There is a real danger that this will lead to unfair competition because the government may be able to absorb some of the costs involved. In such a situation, fertilizer aid programs will have to be adjusted. One solution may be to tender out aid fertilizer to distributors through the so-called auction system as is practiced in the Philippines. But there is the danger of flooding the market and squeezing margins too much. An alternative is to make available foreign exchange to be used to finance importation by domestic importers.

Generation of Counterpart Funds

Another problem area encountered in Netherlands fertilizer aid programs is the slow and sometimes only partial generation of counterpart funds from the sales of fertilizers. This may have several causes. It may be the result of failing financial management in the institutions charged with the distribution of fertilizer. A second cause may be the policy of the government in setting fertilizer prices. This may result in the gross margins allowed for distribution being too small to cover the real cost of handling, storage and transport. Fertilizer aid is then in fact used to finance subsidization of fertilizers by setting farmers' prices below costs. Third, the failure to generate the counterpart funds may be caused by a low degree of recovery of loans from buyers of fertilizer: either distributors or farmers.

7. Past and Future Activities of AFTMIN[11]

Introduction

In November 1987, IFDC-Africa organized a Workshop on Fertilizer Procurement, Information and Communication Requirements in Sub-Saharan Africa, in Lomé. At that meeting, the delegates, representing 13 countries, urged IFDC-Africa to initiate the African Fertilizer Trade and Marketing Information Network (AFTMIN).

Subsequently a project proposal for funding of the Network was submitted to the "Directoraat Generaal voor Internationale Samenwerking" (DGIS) of the Netherlands. The proposal included also a request for funding of studies on supply, marketing and use of fertilizer in nine West African countries: Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali, Niger, Nigeria, Senegal, and Togo. Funding of the project was approved, and the project started on July 1, 1988.

Objectives

The project operates with the following objectives:

1. To strengthen the fertilizer sector in sub-Saharan Africa, as a prerequisite to attaining food self-sufficiency in the region.

2. To establish a network to facilitate the collection, exchange, and dissemination of fertilizer-related data in the region.

3. To undertake detailed studies on the supply side of the fertilizer sector in support of the data collection function of the network and to facilitate formulation of sound policy recommendations to overcome problems in the fertilizer supply system. The country studies should also analyze the role of fertilizers in maintaining soil fertility and in stopping the irreversible processes of soil degradation.

Summary of Activities and Achievements

AFTMIN

At the Workshop on Fertilizer Procurement, Information and Communication Requirements in Sub-Saharan Africa, correspondents for AFTMIN were identified and currently the following countries participate in the network: Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ethiopia, Ghana, Lesotho, Madagascar, Mali, Niger, Nigeria, Rwanda, Senegal, Tanzania, Togo, and Zambia (Sudan joined in January 1990).

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11. Presented by R. Coster, Market Analyst, IFDC-Africa.

To facilitate the collection of information on the fertilizer sector, two questionnaires-on the fertilizer situation in Africa and on fertilizer marketing costs and margins-were prepared in the two working languages of the Center, French and English, and circulated. Completed questionnaires were received from Benin, Burkina Faso, Cameroon, Ethiopia, Ghana, Madagascar, Niger, Togo, and Zambia. The information provided through the questionnaires on the fertilizer situation will be validated and subsequently entered in a computerized data base. The results of the 1987/88 survey on fertilizer marketing costs and margins-which are published in French and English-can be summarized as follows:

* Urea was imported on a c.i.f. bagged basis in the range of $121.40 to $237.30 per tonne. This compares with a 1987/88 price for urea, f.o.b. Middle East, bagged, which varied between $105 and $140 per tonne.

* Marketing costs varied between $59 (Zambia) and $157.74 (Madagascar). For Benin, the marketing costs ($151.82) outstrip the c.i.f. import costs ($121.43) and make up 55.6% of the total costs.

* Ghana, Madagascar, Zambia, and to a lesser extent Ethiopia are subsidizing the sale of fertilizers. Benin and Burkina Faso reported a complete withdrawal of subsidy, whereas Ghana is gradually removing its fertilizer subsidy, which stood at 34%.

* Transportation formed the most important cost item in each of the countries. Rail transport is used to a large extent in Benin and Madagascar; it is much cheaper than transportation by truck.

* Interest charges were also considered high because the cotton farmers receive imports on credit and reimburse the distributors-often the cotton industry-out of the proceeds of the next cotton harvest.

* Recommendations to reduce marketing costs include the following: improve infrastructure (roads), introduce private transporters in an attempt to increase competition, reduce the number of handling operations, and finally streamline fertilizer procurement by privatizing this activity and including the option to import in bulk with local bagging.

Correspondents are encouraged to provide the AFTMIN secretary on an ad hoc basis with trade information, including details of fertilizer tenders and also of concluded contracts. In return, members can request specific fertilizer market information, which is made available in direct response to their requests.

Such requests are entertained not only from the member countries, but also from international organizations. Importers from Cameroon, Ghana, Nigeria, Senegal, Tanzania, Togo, and Zambia have already made use of this service; in addition, international organizations like International Fertilizer Industry Association Ltd. (IFA) and International Institute of Tropical Agriculture (IITA) requested different types of information pertaining to fertilizer marketing. It is expected that, as IFDC-Africa's services gain widespread recognition, these requests will become more frequent.

The marketing group of IFDC-Africa is subscribing to the major publications of the fertilizer commodity press, which are scanned on a regular basis.

The information thus collected is analyzed and disseminated by two formal channels: IFDC Fertilizer Trade Information Telex, and African Fertilizer Market.

Both services were initiated in July 1988 and are published on a monthly basis in French and English. The telex service is transmitted to 27 destinations, usually on the second Friday of the month.

The deadline for African Fertilizer Market is set at the last Friday of each month; about 120 copies of the English version and 70 copies of the French are mailed. A readership survey, which was undertaken in November 1988, was very encouraging: the African Fertilizer Bulletin was received in good order and its timing and frequency were considered adequate. The recipients, mostly importers, distributors, and producers, considered the publication helpful in executing their duties. A number of items were found to be lacking, and requests were made to include the ex-factory price in Europe and the United States, delivered price in sub-Saharan countries, costs per nutrient, telex numbers of suppliers, costs of bags and bagging, and a calendar of meetings. In subsequent issues, most of these topics have been addressed. In other cases, individual replies were provided.

From 22 to 24 November 1988, the First Annual Meeting of the African Fertilizer Trade and Marketing Information Network was organized by IFDC-Africa at Lomé, Togo. Seventeen participants from 12 countries and five observers, who participated at their own expense, attended the meeting. The meeting addressed the following subjects: privatization of the fertilizer sector, the cost of importing fertilizer, including freight rates and internal marketing costs, and fertilizer supply in sub-Saharan Africa. The active participation and the lively discussions confirmed the belief that there is a great need for African marketing personnel, including producers, importers, exporters, and distributors from the public or private sector, to meet and to discuss the pressing problems confronting them. A report on this meeting has been prepared.

Country Studies

The second main activity of the project, Monitoring, Collection, and Dissemination of Fertilizer Informations is the country studies. This aspect of the project is implemented in close collaboration with the "Landbouw Economisch Instituut" (LEI). A standard approach to the country studies has been developed. In the initial stages the authorities of each country are approached with a request to jointly undertake a study of the fertilizer sector. After approval, the terms of reference are prepared and submitted to the Government. The Government appoints a collaborating organization, and a mission is organized to identify possible contacts, collect information, and set up a tentative schedule for the official mission. A period of desk research precedes the official mission. Report writing and discussion of the draft report with the collaborators lead to a final version of the study, which is then submitted to the Government.

Benin

A preparatory mission to the Republic of Benin took place in July 1988. The Ministry of Rural Development and Co-operative Action appointed its Direction d'Etude et de Planification (DEP/MDRAC) as the local collaborator. In October 1988, an IFDC-Africa/LEI team visited Benin to undertake the fertilizer sector study. A copy of the study is available upon request.

Burkina Faso

In preparation of the country study on the supply, marketing, and use of fertilizer in Burkina Faso, a mission was organized in August 1988. The study in Burkina Faso took place in January 1989. The Projet Engrais Vivriers (PEV) is the counterpart for this study. Report writing is currently in progress with participation of the PEV. From 17 to 23 June 1989, Mr. E. Kafando (PEV) visited IFDC-Africa to finalize the draft of the country study on the fertilizer sector in Burkina Faso.

In its presentation of the preliminary research findings, the study team stated that the agricultural potential of soils all over Burkina Faso has not been systematically researched, and there is need for an accurate soil map. However, most studies note the general lack of phosphate and nitrogen in the soil. The addition of sulfur is important for cotton and cereals; potash is necessary for sugarcane and cotton, and boron is necessary for cotton.

A national effort is made in Burkina Faso to develop the use of indigenous phosphates in order to take advantage of local resources in the production of fertilizers. The report will include a creative recommendation to stimulate the production of rock phosphate and to save foreign exchange by substituting imported phosphates.

It would be important to evaluate, in economic terms, the special cotton fertilizer compound, which carries a premium of US $30-40/tonne. It is a nonconventional product and therefore is very costly to use on crops that do not require boron.

It would also be important to study the results of the trials organized under the PEV in order to elaborate on the economics of the fertilizer recommendations for different cultures and agroecological zones.

The importance of organic matter-from the point of view of soil conservation-is now well established. The availability of this input is limited, and thus its use on a large scale is not possible in the immediate future. Increased use of fertilizers will increase the total biomass, and more crop residues will be released to balance the level of soil organic matter. Notwithstanding the many studies that have already been undertaken, efforts to develop a sound water and soil conservation policy deserve greater attention.

Although the potential for irrigated soils (160,000 ha) is limited, irrigation schemes need to be further developed, because less than 10% of the potential area is presently cultivated; an increase of fertilizer use is expected to result from the development of this potential.

In the past, fertilizer use was mainly linked to the development of the cotton sector. However, because of the growing population, the degradation of the soils, and the need to intensify agriculture to reach food self-sufficiency, fertilizers should play an increasing role in augmenting grain production. Demand projections included in the study confirm this requirement. The "groupement villageois," initiated by farmers, could constitute an effective means for agricultural development. Although no accurate data are available on the subject, it is felt that farmers are not well organized and that many problems in the area of the supply of inputs remain unresolved.

Inputs distribution, which is handled by Société Burkinabe de Fibres et Textiles (SOFITEX), Societe de Developpement Industriel Meanique et Agricole (DIMA), and the Centre Régional de Promotion Agropastorale (CRPA), is relatively effective. But it is important to reduce the cost of importation and marketing. In particular, the financial costs incurred by SOFITEX should be reduced. It was also thought important to monitor the international fertilizer market trends in order to be able to take appropriate measures at the national level, especially now that the subsidy has been abolished.

It is essential to inform farmers of fertilizer prices before distribution starts. Peasants are aware of the benefits of fertilizer. What is discouraging them is the unfavorable fertilizer cost: produce price ratio. The fact that there is no guaranteed grain market is a serious constraint to increased crop production under systems that use inputs.

The PEV has an important role to play. Due to its neutrality and the wealth of information that it collects, it is well positioned to prepare periodic analyses of the fertilizer situation in Burkina Faso, which should be acceptable to all involved in the sector.

The team concluded that it is an economic and political reality that fertilizer use on food crops is hindered by three factors: high cost of fertilizer, uncertainty about markets for agriculture surpluses, and an underdeveloped credit system.

Togo

The study on the fertilizer sector was undertaken in cooperation with the Service des Engrais et Moyens de Production (SEMP) in April 1989. The location of the IFDC-Africa Headquarters in Lomé made it possible to establish numerous and important contacts and to visit them more than once if required. Within the country, visits were made to most national and international institutions and organizations dealing with fertilizers.

Contacts made with the EEC representation in Lomé provided data collected during a consultancy specially undertaken for the EEC sectoral support program, which includes funding of the importation in 1989/90 of fertilizer and plant protection products in Togo. The collaboration with the consulting group led to joint efforts to optimize the distribution of fertilizer due to arrive in Togo in late 1989. The results will be recorded in the report.

Further, good contacts have been established with donors and organizations active in rural development, such as Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) and CARE International. This allowed the IFDC-Africa team to locate geographical areas in Togo where, due to an excellent extension service, food crop intensification is taking place. The reasons for these successes are studied, particularly with regard to the credit schemes for the purchase of agricultural inputs and the way farmers' organizations developed forward and backward linkages. As a result, the study has a dynamic outlook, which facilitates an estimation of future fertilizer needs based on the projected intensification of agriculture.

Finally, an in-depth study is included covering the use of local phosphate rock and dolomite deposits of the country, which are not yet used for agricultural purposes.

Niger

A data collection mission to Niger was held in September 1988. Approval to undertake the study in Niger has been received from the Ministry of Rural Development; IFDC-Africa and LEI cooperated with the Centrale d'Approvisionnement. The study took place in July 1989.

Steering Committee

A Steering Committee for the DGIS project was pursued. Members of the team were approached, and the following people agreed to become members of the Steering Committee : Dr. S. K. Dapaah, Ministry of Agriculture, Ghana; Mr, M. Koutaba, Comité Permanent Interétats du Lutte contre le Sécheresse dans le Sahel/Permanent Interstate Committee for Drought Control in the Sahel (CILSS), Burkina Faso; and Mr. J. J. Neeteson, Ministry of Agriculture, The Netherlands, all agreed to become members of the Steering Committee. The first meeting of the Steering Committee took place on 2 and 3 February 1989; Dr. S. K. Dapaah was elected chairman, and it was agreed that IFDC would provide the secretary. A review of the project activities was presented, followed by a report on the study of the fertilizer sector in Benin. The Steering Committee spent considerable time on the Terms of Reference, and detailed guidelines were provided for future country studies. Subsequently, the country studies for Togo and Niger have been prepared according to this format and in both cases were approved by the Steering Committee. In principle it was agreed to meet again in July 1989. However, in view of an evaluation by the project donor, which took place during August-September 1989, it was decided to postpone the meeting of the Steering Committee until after the second Annual Meeting of the African Fertilizer Trade and Marketing Information Network; the Steering Committee will meet on 18 and 20 November 1989.

Sub-Saharan Fertilizer Data Base

During March and April 1989, a consultancy was undertaken by a computer specialist with experience in setting up data bases related to fertilizer. Thus the foundation for a Sub-Saharan Fertilizer Data Base was laid. During August-September 1989, the consultant further updated the data base. It includes files on nutrient and product fertilizer statistics, marketing cost, subsidies, retail prices, trade information, production units, marketing units, fertilizer use and the economics of fertilizer use, production data per crop, and crop market prices. The information will be retrievable per nutrient or product, and/or on a country or regional basis. An associate expert will be in charge of managing this data base. Subject to the availability of funds, national fertilizer data bases will be installed. These systems will be on-line with the Sub-Saharan Fertilizer Data Base. In this way the AFTMIN members may benefit from the data collected; likewise IFDC-Africa has entry to the national data bases. In the meantime, data will be made available upon request from the members.

Manpower Situation

Staffing of the marketing group is as follows:

* R. Coster	Coordinator AFTMIN and market analyst. Starting date: 15 January 1988.
* K. Dahoui	Research assistant. Starting date: 1 June 1988.
* M. André	Marketing expert. Starting date: 1 February 1989.
* H. Gerner	Associate expert. to be Recruited in February 1990.

Contacts With Other Organizations

The market analyst participated in the FAO/Fertilizer Industry Advisory Committee (FIAC) meetings. Important for the future relationship between FAO and IFDC-Africa was the intervention made by Belgium's Permanent Representative to FAO, who stated that his government was favorably impressed with the activities of the Fertilizer Advisory Development and Information Network for Asia and the Pacific (FADINAP), based in Bangkok, and was ready to support a similar initiative in Africa. Following further meetings between FAO and IFDC, it was agreed that FAO would support the marketing activities of IFDC-Africa and that one or two permanent staff would be placed at the IFDC-Africa office at Lomé, Togo. A proposal for funding of these additional FAO activities has been approved recently.

The impact of the work of the marketing group will be considerably strengthened. A possible work program could include follow-up activities of the country studies (besides participation in the country studies) as well as a marketing training program. In addition to general training courses in fertilizer marketing, the plan is to organize training programs on special subjects related to fertilizer supply, marketing, and distribution. The establishment of Fertilizer Intelligence Units, possibly attached to the early warning systems that are in place in most sub-Saharan countries, could also be explored.

The market analyst attended the Annual Conference of the International Fertilizer Industry Association in June 1988. A joint paper with Mr. I. Barry, ECA, Industry Division, on the fertilizer supply situation in sub-Saharan Africa was presented at this meeting. An exchange of published information was discussed.

Further contacts were established with CILSS. A memorandum of understanding was signed to formalize the cooperation between the two organizations, particularly as far as the country studies are concerned. A CILSS representative attended the First Annual Meeting of AFTMIN in November 1988. At that point, further collaboration was discussed. The CILSS country representatives in

the member countries would in the future be involved in the country studies.

The marketing expert has initiated contact with the Gembloux University, Belgium, with the objective of cooperating with the university in organizing training programs related to fertilizer marketing.

Publications

Besides the earlier mentioned IFDC-Africa Fertilizer Trade Information Telex and the African Fertilizer Market, the marketing group prepared the following documents:

* Fertilizer Marketing Costs and Margins in Sub-Saharan Africa, presented at the First Annual Meeting of the African Fertilizer Trade and Marketing Information Network, November 1988 (R. Coster).

* Privatization of the Fertilizer Sector, African Fertilizer Review, January 1990 (R. Coster).

* Alleviating Fertilizer Supply Constraints in West Africa, February 1989 (R. Coster).

* Global Fertilizer Demand and Supply Situation with Special Emphasis on Sub-Saharan Africa, April 1989 (M. André, R. Coster).

* Report on the First Annual Meeting of the African Fertilizer Trade and Marketing Information Network, July 1989 (M. André, R. Coster and F. Makken).

Problems

The verbal agreement to participate in the Network was unanimously made by those who attended the Workshop on Fertilizer Procurement, Information and Communication Requirements. However, except for Benin, Ghana, Mali, Senegal, and Zambia, there was no official confirmation of membership by the Governments concerned. In time a new effort will be made. It is likely that uncertainty exists concerning the financial implications attached to this membership, although it was explained that none existed. With the improvement of the services provided, the backing of CILSS, and the cooperation with FAO, AFTMIN should be a major resource to the fertilizer sector. At the end of March 1990, Burkina Faso, Madagascar, Ethiopia, Niger, and Sudan are also registered as members.

The inflow of information from the participating countries should be strengthened. Personal contacts are an important factor in this respect. Intensive travel is proposed, and attendance at international meetings is also recommended as ways to solve this

lack of participation. The contacts established during the country studies are extremely valuable in this connection. Already non-solicited articles are being submitted for publication in the African Fertilizer Market, which is encouraging.

A) WORK GROUP I, ALTERNATIVE SUPPLY STRATEGIES.

1. Local production using imported raw materials

In general, except for small-scale utilization of indigenous phosphates for direct application, this option appear to be economically unviable except in rare instances.

2. Local production using indigenous raw materials:

a. If all materials are available locally at a reasonable (competitive) price, it is possible, even on a relatively small scale to compete with imported materials.

b. If only one raw material, i.e. phosphate or natural gas for nitrogen is available, then there is a possibility, given large enough markets (like Nigeria) to produce materials for local consumption and/or export.

c. If the raw materials are low quality, i.e. pyrites instead of sulfur for production of sulfuric acid, there can and probably will, be an expense involved in using these materials. Essentially the cost of the capital investment and/or operating cost can be increased substantially using these types of units to experience difficulty in competing with imported materials.

d. Using local raw materials even if low quality, phosphate rock for instance, can save foreign exchange and replace import to some extent. Even though attempts have been unsuccessful to date, these alternatives should be studied

3. Regional cooperation in tendering

The concept of regional cooperation is possibly politically difficult right now for almost all imagined combinations in West Africa. It is however, possible to envision cooperative arrangements in the future; for example, the possibility exists to develop cooperation through organizations such as ECOWAS or through existing cooperative programs such OCBN for Benin and Niger, or Liptako-Gourma Authority, etc. Upon request from governments or donors IFDC could undertake studies in this field.

4. Regional cooperation on specifications to increase competition

Rationalization of formulas: For cotton as an example, we have the following :

12-22-12+5S+1B
14-22-14+6S+1B
13-23-13+5S+1B

There are also several other variations which reflect either slight changes in the N, P_2O_5 and K_2O or differences like 1% or 0.5% in the S and B specifications. Essentially all of these grades are the same from an agronomic standpoint. If the producer realizes that the possibility exists to supply 100,000 tonnes or greater quantities of one single formula, it could favorably affect the price to the West African countries. There is a need for better recommendations for crops that are being intensively farmed.

Standard fertilizers are probably better in the areas where very low application rates are being used. Possibly for countries with low use, 3 grades would suffice : 15-15-15, a high nitrogen grade and a high phosphate grade.

5. Import in bulk and local bagging.

This procedure has been attempted with success in several countries in sub-Saharan Africa including Ghana, Kenya, Sudan and Tanzania. In each case, even with some large problems, those operations have been successful both from technical and economic standpoints. The level and type of products used will be different for each country and there is the requirement for bags, equipment for unloading ships in bulk, bagging machines or hoppers with a portable weigh scale. The expertise for carrying out these types of operations can be rented. Equipment can be leased and normally arrives in containers which can be mounted on the guay. Portable packing lines have been gaining in popularity for many years. These range from sophisticated units mounted in containers to smaller portable bagging machines. There are many variations, e.g. electronic vs mechanical weighers.

6. Import in bulk with blending and bagging

Counter Trade

Commodities for export which can be traded for fertilizers. Rules affecting counter trade vary from country to country and must be entered into at government level.

B) WORKING GROUP II, GUIDELINES FOR EFFICIENT EXECUTION OF FERTILIZER AID PROGRAMS

The working group on fertilizer aid discussed the following major issues :

i. Regional cooperation;
ii. Multi-year commitment;
iii. Donor coordination;
iv. National fertilizer policy;
v. Donor - recipient cooperation and

Several minor issues under each major heading were also analyzed. The main conclusions of the disscussions under each issue could be summarized as follows :

1. Regional Cooperation

a) In the light of the small size of the fertilizer market at the country level, regional and sub-regional cooperation among countries should be promoted to take advantage of bulk purchasing and lower costs.

b) The existing regional bodies like ECOWAS, SADCC and others should be used to promote this type of cooperation.

c) Lack of information about fertilizer products, agronomic practices, and fertilizer requirements among different countries is a major constraint to promoting such cooperation. To promote the flow of information and to institutionalize it, the recipient countries should cooperate with IFDC in providing accurate information about different aspects of the fertilizer sector in African countries through AFTMIN.

2. Multi-year commitment

a) Because of changing conditions, both the donors and recipients may prefer not to have long-run commitments. However, already a 3-year commitment on the part of donors will facilitate the planning of fertilizer imports in the recipient country.

b) Any multi-year contract on fertilizer aid should provide flexibility.

3. Donor cooperation

a) The multiplicity of donors in a recipient country leads to duplication of efforts and wastage of resources. In order to reduce such wasteful use of resources, the recipient country should arrange meetings of all donors and determine optimum quantity and type of fertilizer products likely to be available from each donor.

b) As the policies and programs of each country are different, donor coordination at the regional level is unlikely to be fruitful.

4. Fertilizer policy

a) Many countries in sub-Saharan Africa do not have a well-articulated fertilizer policy, and therefore, do not attach the required priority to the fertilizer sector.

b) To improve political perception about the importance of fertilizer impact in sustaining agricultural growth and providing food security, the U.N. agencies like FAO, and the African regional institutions should be used. The research institutions like IFDC should also help in this area by doing quality research.

c) The national fertilizer policy should address issues dealing with agronomic needs, pricing policy, research and extension and marketing and distribution. It should also deal with optimum supply strategy and the role fertilizer aid can play in it.

5. Donor-recipient cooperation

a) To promote cooperation between donors and recipients, the donors should minimize conditions attached to fertilizer aid and should appreciate the constraints under which many recipient countries have to operate. The donor should also simplify the procedures used in approving requests for fertilizer aid.

b) To the extent possible, tied commodity aid should be replaced by free foreign exchange to purchase fertilizers in international markets. This move will help in reducing prices paid by African farmers.

c) To increase the efficiency of aid fertilizers and other imports, the recipient country should provide local funding on time and improve its internal distribution system.

d) The recipient country should identify their agronomic needs properly and develop their capabilities to analyse the impact of various policy conditions on the development of their fertilizer sectors.

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