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SELECTED POLICY ISSUES : MAIZE

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Preface

The purpose of this paper was to summarize selected aspects of the current economic situation with regard to maize.

The following members of the Service d'Etudes et Planification, Bureau d'Analyse Economique have provided inputs either of data or comments : Citoyens : Ngemba Long-Makanda, Muteba Mpoy, Budiadio Mutele Diulu. Some helpful suggestions were made by members of the Chemonics team : C. Camacho, D. Barnett, G. Branson, E. Rawson; by H. Dinh, World Bank Project representative attached to the SEP and by Paul De Vuyst, Belgian Technical Assistant to SEP.

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Summary

The purpose of this short report was to comment on selected issues concerning the availability of maize in Zaire. A more detailed look at production, demand and marketing has been carried out in commodity reports by the office of economic analysis, Service d'Etudes et Planification (2). A recent commodity report is in the review stage.

National demand for maize exceeded local production resulting in imports of 56,000 mt representing the equivalent of 8 % of local production in 1987 and having a Kinshasa market value of $ 16 Million. Per capita production appears to have declined since 1980 leading to a conclusion that the production data series and/or population estimates are faulty.

However using the data available and FAO estimates of theoretical demand, production would need to grow at the rate of 4 to 5 %/year between 1987 and 2000 to meet this demand. Assuming that this demand is a high estimate, and given various maize production projects coming into maturity, supply should approach demand during this period. In the short term, given marketing constraintes and urban demand, imports will need to be continued. A cheap food policy for urban centres might be considered politically useful in the very short term. Further increases in imports might not affect producer prices given marketing constraints and high demand.

Real prices in Kinshasa appear to have increased from 0.08 to 0.11 Z/kg between 1980 and 1987, that is at a slow rate, and consumption seems to have been affected, as expected. A closer look at the relationsh: between maize, maize, and manioc flour needs to be done.

Selected issues were discussed based on the author's visit to the Zone of Bumba in 1988. These were the profitability of production and marketing. It appeared that traditional production produced a kg of maize for the least expenditure . Production was increased with improved seeds (assuming these to be available) with a reasonable increase in cash costs and a reasonable level of profit. However as soon as fertilizers were purchased, cash costs multiplied and profits disappeared. Marketing margins were tight from rural areas into Bumba but were attractive between Bumba and Kinshasa.

Other issues raised were the unavailability of improved seeds, the possible use of locally organised groups to multiply improved seed and the role the large local traders.

Selected Policy Issues : Maize

Brook A. Greene

Introduction

In 1985 maize made up roughly 3.2 % of the total volume of agricultural production, 3.4 % of total food crop production but 66 % of total cereal production (1,p10). Hence, maize is not very important in the National Economy in a physical sense.

However, from the point of view of it's role in nutrition and the national diet, maize is very important. It is second to manioc in providing an average of 19 % of the carbohydrates in the national diet, ranging from a low of 1 % in Bas-Zaire and Equateur to 45 % in both Kasai and 55 % in Shaba (3,p14). The average for Kinshasa was that 10 % of carbohydrates were obtained from maize.[1]

---

1) These figures appear to be for a period prior to 1979. After 1987, the Bureau of Planning,SEP, carried out short household urban consumption surveys. The results were reported in a series of regional reports as follows : Shaba report, 1982 data, p54 : 68 %; Kasai-Occidental report,1985 data,p49: 31%;Kasai-Oriental report, 1983 data,p47: 23 %; Bas-Zaire report,1985 data, p44 : 0.8 %. See Regional Reports (3).

Imports of maize have declined from 108,000 mt in 1980/81, toroughly 56,000 metric tonnes in 1987. This had an estimated Kinshasa market value of $ US 16.5 million. This was a considerable sum although making up only 1 % of the total estimated Kinshasa market value of imported food products (Table 1).

Therefore maize has continued to be a costly and important import item although being least important of all food imports in terms of value[1]. Given it's relative low cost but important position as a staple food, a short term policy could be supported to keep maize prices down in urban areas. This could be effected though import liberalization. The impact on producers would need to be carefully considered. Given the extent of apparent deficits in supply, these should be some potential for further imports without causing a negative effect on local production. This would need to be studied further.

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[1] A substantial amount of maize grain and flour has been imported from Zambia up to now due to apprently subsidised production costs resulting in cheaper sale prices. However, there is some indication that these policies may be stopped causing future prices to go up and making local production more competitive. The flow may be reversed i.e. from Zaire to Zambia.

Table 1 : Estimated Value of Selected Imported Food Products, Zaire, 1987 ‡

Product	Average Market Price Kinshasa [1]		Volume Imports [4]	Estimated Value		% of Total Value
	Z/Kg	Z/t	t	Z	$ M	%
Maize (Grain)	33	33,000	56,000	1,848x10⁶	16.5	1.2
Rice	57	57,000	70,000	3,990x10⁶	35.6	2.8
Wheat Flour	61	61,000	68,000	4,148x10⁶	37.0	2.7
Wheat Grain	25 [2]	25,000	215,000	5,375x10⁶	48.0	3.6
Sugar	110	110,000	50,000	5,500x10⁶	49.1	3.8
Meats	1000 [3]	1,000,000	50,000	50,000x10⁶	446.4	33.0
Fish	1000 [3]	1,000,000	80,000	80,000x10⁶	714.3	53.0
Total				150,860x10⁶	1,347 [5]	100.0

‡ Estimated by author

[1] I.M.F. Table of Average Prices for Kinshasa Market (4)

[2] 1985 = 17 z, 1987 = 37 z

[3] Estimated

[4] Estimated and rounded. All tons are metric.

[5] 1 $ = 112 z average for 1987, I.M.F. Official rate (4)

Official UN FAO 1987 figures were : All Maize 5-7, Rice 15-17; Wheat grain 25-30; Sugar 17-20; Meat 25-30; Fish ? . The total was therefore officially much less than the Kinshasa Market Value. The reasons for this large (perhaps 10 times) difference should be studied.

Demand and Supply

Maize production was estimated to have grown by 3.97 % per year between 1971 and 1981 (2,p57) and 3.74 % between 1980 and 1987 (Table 2). As a result, production per capita should have increased if population growth rates had been around 3 %. However, it appears that either the production data are inaccurate or that population has grown at a greater rate than production. In any case, production per capita seems to have gone down (not up) since 1980 and to have stabilized at around 22 to 24 Kg. While the effect of imports was considerable prior to 1982, current levels have raised total consumption to around 24 Kg/capita per year. This is not very much less than the estimate of 25 Kg made for 1970 (Table 2). One can conclude that there has not been an increase in consumption per capita between 1970 and 1987.

Assuming a theoretical demand of 838,000[1] tonnes in 1987, actual estimated production of 730,000 tonnes, and a rate of growth in demand for maize of 3.4 % per year to continue from 1987 to 2000, maize production would need to grow at a rate of 4.4 % per year to equal theoretical demand by the year 2000 (Table 3). The growth rate per year to reach this requirement could be as high as 5.3 %/year if one used the higher figures for theoretical demand estimated in the report Situation Actuelle.... ..(6).

Hence, it appears that this growth of production may indeed be possible given the number of projects concerned with maize production currently being undertaken in Shaba and the two Kasai regions. However, a deficit in supply can be expected to continue in the shorter term i.e. the next 10 years. Therefore, maize imports will have to be continued if not increased as more maize is used in animal feeds, beer production and by-product preparation.

If rates of growth in production and theoretical demand continue as per 1980 to 1987 figures, the deficit between demand and production can be estimated and evaluated in terms of dollars. This exercise was carried out through the year 2000 using an assumed rate of increase in the market price of maize of 50 % per year and a similar 50 % increase per year in the exchange rate over this period. That is to say that real prices would remain fairly steady as they have between 1970 and 1987 (See Annex 3). Imports would need to be between 100,000 and 300,000 metric tonnes in the year 2000 at an estimated value of $ US million 35 to 84. This estimate of required imports is about the same as in 1987/88 (Table 4).

---

[1] Based on F.A.O. estimates of 3,000 calories per day per adult male. This is probably too high. If we use 2,500 this would represent a 17 % drop in the theoretical demand used here or a total of 1,073,200 mt as compared to 1,293,000 mt.
Then r = 2.2 %/Year.

Table 2 : Estimation of Per Capita Maize Production/Consumption, Zaïre 1970-1983 ‡

Year	(1) Production [1] (t)	(2) Population [2] (000)	(3 = 1/2) Prod/Capita (Kg/yr)	(4) Importation [3] (t)	(5 = 1 + 4) Apparent Consumption (t)	(6 = 5/2) Consumption Per Capita (Kg/yr)
1970	428,000 ‡‡	19,286	22.2	64,000	492,000	25.5
1980	642,000 ‡‡	26,377	24.3	102,000 ‡‡	744,000	28.2
1981	714,770 ‡‡	27,233	26.2	108,000	822,770	30.2
1982	666,250	28,119	23.7	70,000	736,250	26.2
1983	673,070	29,039	23.2	51,000	724,070	24.9
1984	703,950	29,992 [2]	23.5	38,000	741,950	24.7
1985	710,500	30,981	22.9	35,000	745,500	24.1
1986	725,590 [4]	31,818	22.8	58,000	783,590	24.6
1987	730,000	32,677	22.3	56,000	786,000	24.0
1988	753,280 (e)	33,559 (e)	22.4	50,000 (e)	803,280 (e)	23.9

‡ Calculated by Author

(e) = Estimated

- Chiffres arrondis

[1] Growth rate = 3.74 % between 1960 and 1987

[2] Census figure for 1984 was used to estimate figures above and below using a 3 % growth rate/year

[3] These figures do not include corn flour imports. There is considerable disagreement over actual figures.

[4] Of this some 370,000 mt or roughly 50 % was estimated to have been marketed. (Est. des besoins en Crédits de Campagne ..... 1986, DMPCC, Nov 1985

‡‡ There is some dispute about these figures.

Table 3 : Estimated Growth Rates in Maize Production to Match Theoretical Demand *

Year	Theoretical Demand [1] (000 t)	Theoretical Demand [2] (000 t)	Maize Production [3] (000 t)	Deficit (000 t)		(1987 = Base) Growth Rate in Production required Production=Demand	
	(1)	(2)	(3)	(4) = 1-3	(5)= 1-2	(6): t = 3	(7): 2 = 3
1980	662	837	562	100	275		
1981	685	860	639	46	221		
1982	708	885	666	42	219		
1983	732	916	687	45	229		
1984	758	948	704	54	244		
1985	784	973	710	64	263		
1986	811 [4]	1,001	726	85	275		
1987	838	1,077	730	108	297		
1988	866	1,054	757 [6]	109	297		
1989	895	1,080	785	110	295		
1990	925	1,107	814	111	293	7.9 [6]	13.9 [7]
1995	1,094	1,270 [5]	978	116	292	5.1	6.9
2000	1,293	1,459 [5]	1,175	118	284	4.4	5.3

* Calculated by Author

[1] Analyse Sommaire (5, p.64-66), Growth rate 1980 to 85 = 3.4 %/year.
(r = Ln(784/662)/5 = 3.38 %/year). See 11 p 2 for discussion on theoretical demand.

[2] Situation Actuelle ....(6, p.535-543), 1982 - 90

[3] Growth rate 1980 - 87 = (Ln 730/562)/7 = 3.74 % Used to estimate 1988 - 2000

[4] 1986 - 2000 Estimated using growth rate calculated in [1] r = 3.4 %/year

[5] 1995, 2000 estimated using growth rate r = (Ln 1,107/837)/10 = 2.8 %/year, between 1980 and 1990

[6] r = (Ln 925/730)/3 = 7.87 %/year

[7] r = (Ln 1107/730)/3 = 13.87 %/year.

Table 4 : Estimated Value of Maize Deficit, 1987-2000 *

Year	Theoretical Demand [1] (000 t) (1)	(2)	Estimated Deficit [1] (1)	(2)	Current Maize Price (Z/Kg)	Exchange Rate ($ 1 = Z)	Estimated Value US $ Million	
1987	838	1,027	108	297	33 [2]	112 [2]	32 [3]	87 [4]
1990	925	1,107	111	293	111	387	32	86
1995	1,094	1,270	116	292	846.	2,870	34	86
2000	1,293	1,459	118	284	6,423	21,790	35	84

* calculations by author

[1] See table 3

[2] See (4)

[3] 33 Z/Kg X 108,000,000 = 3,564,000,000 Z divided by 112 = 32 $ US Million

[4] 33 Z/kg X 297,000,000 = 9,801,000,000 Z divided by 112 = 87 $ US Million.

Real Price

As we have seen, there appears to be a real deficit between demand and supply which is being partially addressed with imports of around 50,000 mt of maize grain each year. To what extent has real market price of maize been affected by the above situation ?

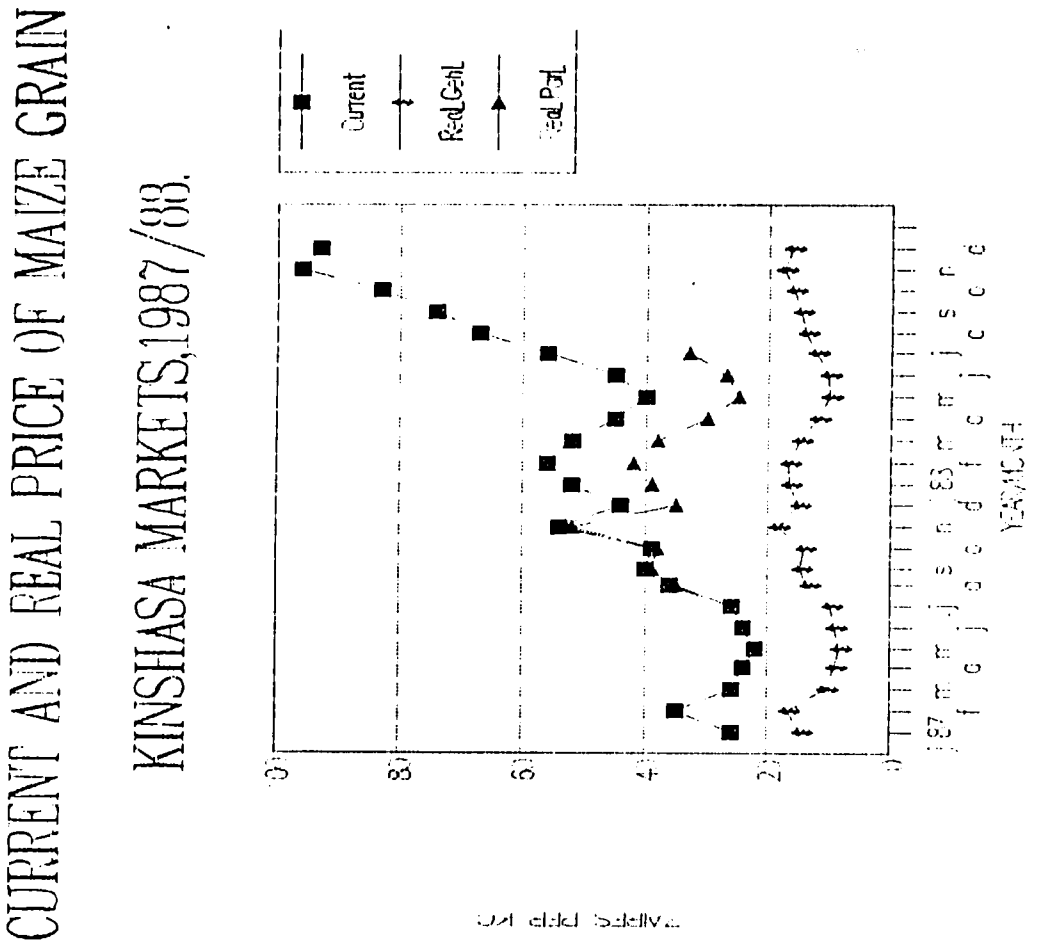
Current monthly prices for 1987 and 1988 show a rapid increase in price of maize grain for Kinshasa markets after June 1987. This increase went from 26 in July '87 to 96 Z/Kg in November 1988 or an increase of 269 % (Figure 1 and Annex 1,2). After deflating with the black market rate of exchange index the real increase for the period July to July was from 26 to 33 Z/Kg or only 27 %. After deflating with the general price index as calculated by the Institut National des Statistiques, the real price changed from 9.7 to 17.5 Z/Kg or 80 % for the whole period, i.e. nearly doubling over the 16 month period.

In fact using these latter figures i.e. real price using the general price index as deflator, between January 1987 and November 1988 real price for maize grain increased at a rate of 0.8 % per month [1].

---

1) r = (ln 17.5/14.6)/22 = 0.8 % per month, Jan'87-Nov'88.

FIGURE 1



-\$- Real price using general price Index, INS (9)

-→- Real price using parallel Exchange Rate Index (9)

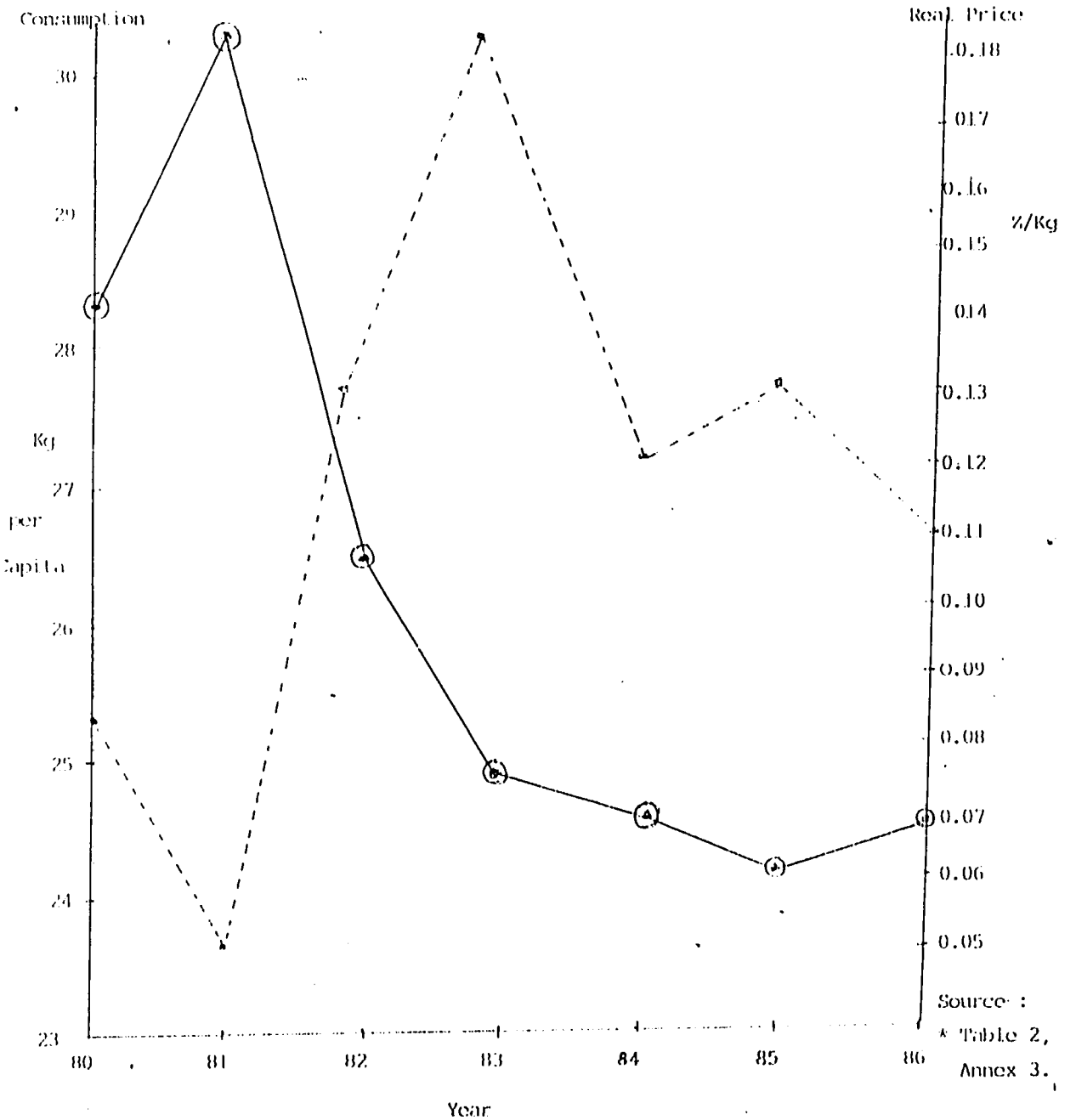
Source : Annexes 1, 2

It would appear from the above that the real price of maize grain in Kinshasa markets has not increased very much between July 1987 and July 1989 (Annex 1). Any increase reflects a continued strong demand for maize, as one would expect, and a continued shortfall in supply. However this shortfall or deficit does not seem to be very large, inspite of our previous analysis. It may be that supply is in fact much greater than estimated through official figures. This could easily occur through cross-border movements not accounted for by Kinshasa statistics. One could argue that if the deficit were larger than it is, that the effect on the real price would have been much more than what has been observed over the last two years.

When one looks at the movement of real grain price in Kinshasa markets between 1970 and 1986, one comes to the same conclusion. There was very little change prior to 1981 and after that a gradual increase from 0.08 to 0.11 Z/Kg (Figure 2). Consumption after 1981 declined as real prices increased, as would be expected. In this case, deflation was with an index of the GNP which figures were obtained from the annual reports of the Bank of Zaire.

Given the fact that maize has to be milled before it is consumed, the relevent price to be considered when relating maize to rice would be that of maize flour. The cost of milling was estimated at 15 % of purchase price for maize grain and 3-4 % for manioc (Ho,p3). Hence the real cost of maize flour should be some 15 % above the market price for grain. These relationships remain to be considered.

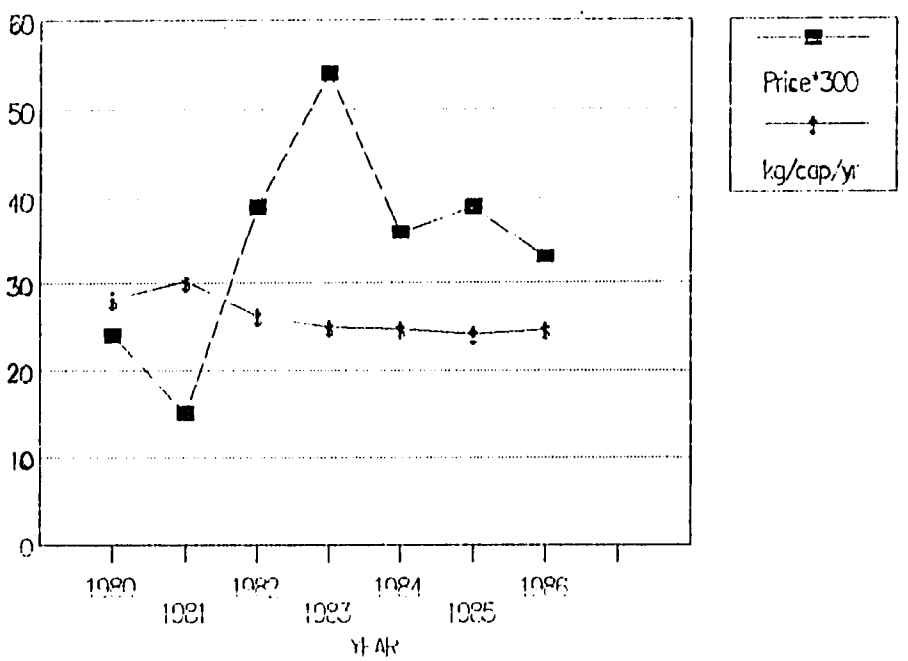
Figure 2 : Consumption and Real Price of Maize grain, Zaïre 1980/86 *



Source :
* Table 2, Annex 3.

FIGURE 2

CONSUMPTION AND REAL PRICE OF MAIZE GRAIN,ZAIRE 1980-88



Source : Table 2 and Annex 3

Figure 3 : Imports and Consumption of Maize, Zaïre

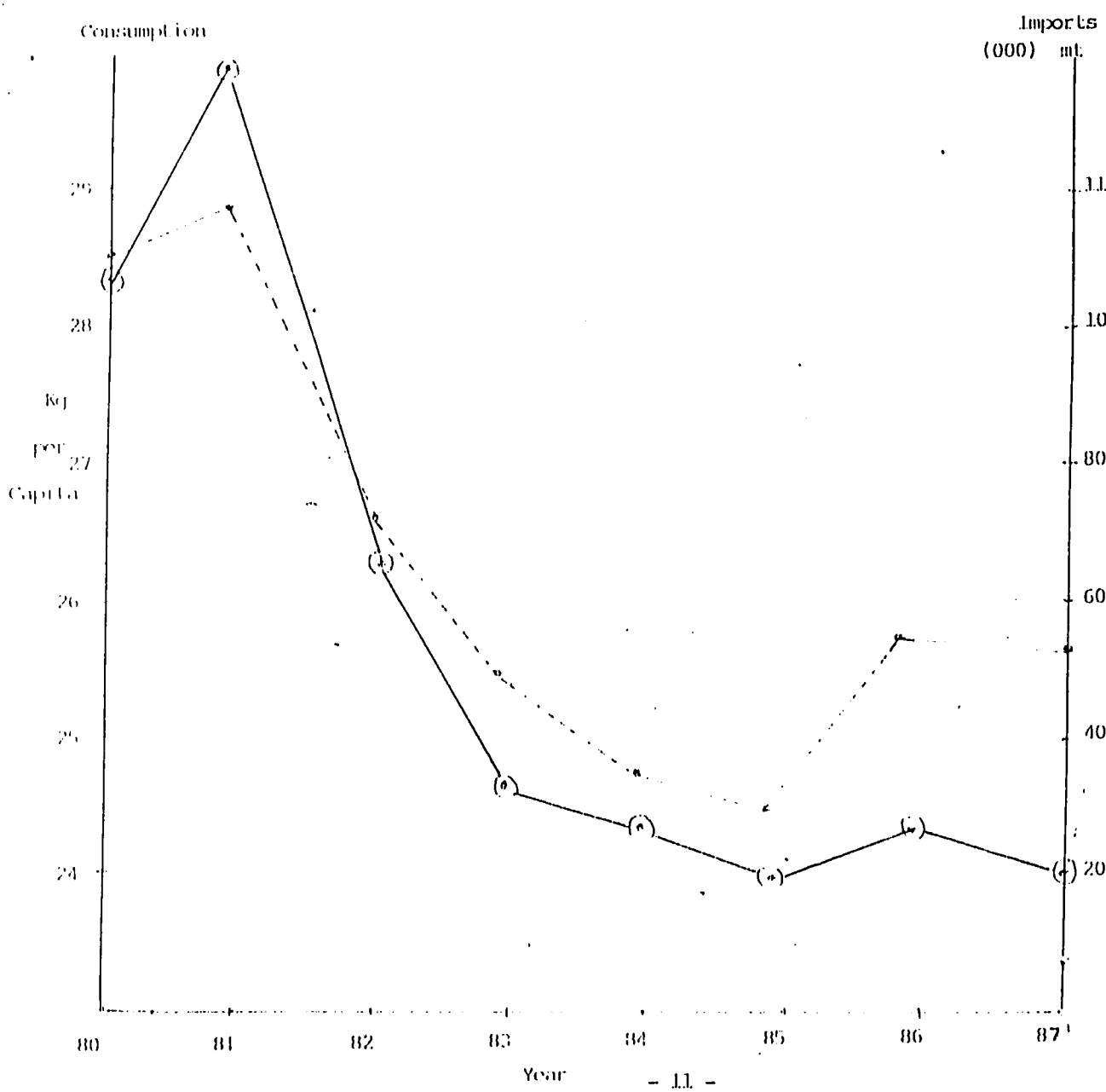
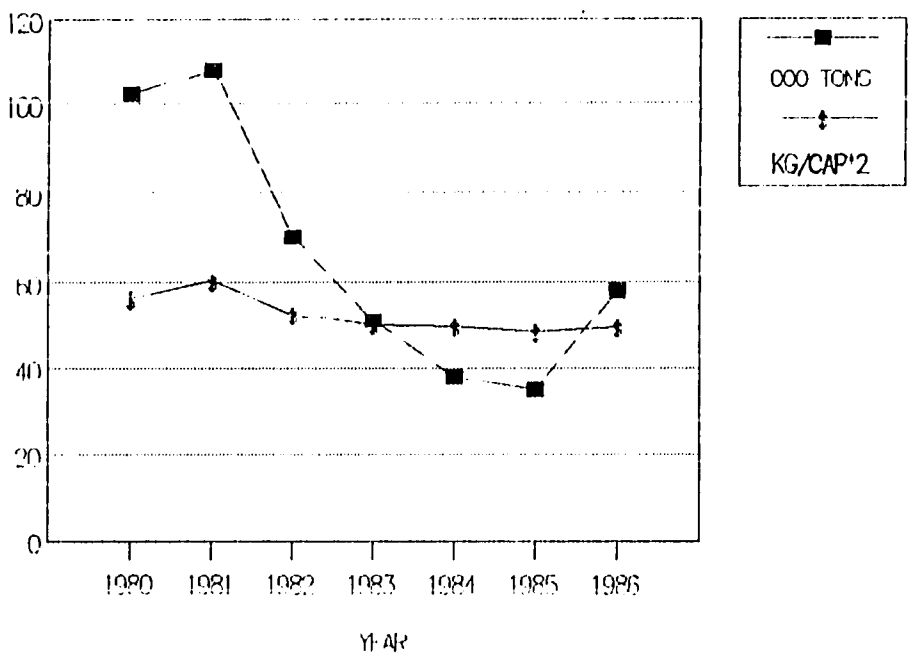


FIGURE 3

IMPORTS AND CONSUMPTION OF MAIZE GRAIN

ZAIRE, 1980 –1986



Source : Table 2

Consumption

We have seen that there has been an increase in real price of nearly double between January 1987 and January 1989. We have suggested that this reflected a deficit in supply which one would expect in a fast growing city like Kinshasa.

The impact of this increase in real price between 1980 and 1986 appears to have been some decline in consumption between 1980 and 1986 (Figure 3).

On the other hand, there appears to be a strong correlation between consumption and the level of imports (Figure 5). Hence the decline in consumption is probably also due to the decline in imports, the continuing shortfall in supply then causing a real price increase which in turn may have affected consumption.

Policy option

A long term maize import policy should be considered at a level of 100,000 mt to begin as soon as possible. Estimates of future demand for livestock feed and by-product production should be made as soon as possible.

Discussion

The many constraintes to the development of the agricultural economy of Zaire and suggestions for improvements have been identified in many reports [1]. Recommendations have been made for each region and, within each region, for specific programs (See for example 10,p197,271). The general reader can look at these reports. The intention here is to comment briefly on selected topics within the broader constraintes. These comments are based on observations made during a three week visit to the zone of Bumba in July and August 1988.

A discussion on the lack of reliable data and the absence of data analysis was previously made (11,p14). Some of the comments on agronomic concerns are also relevant here as they would be of concern with any crop. The comments on economic concerns are also relevant, especially the future role of large traders.

The two further problems discussed here are the profitability of producing and marketing of maize.

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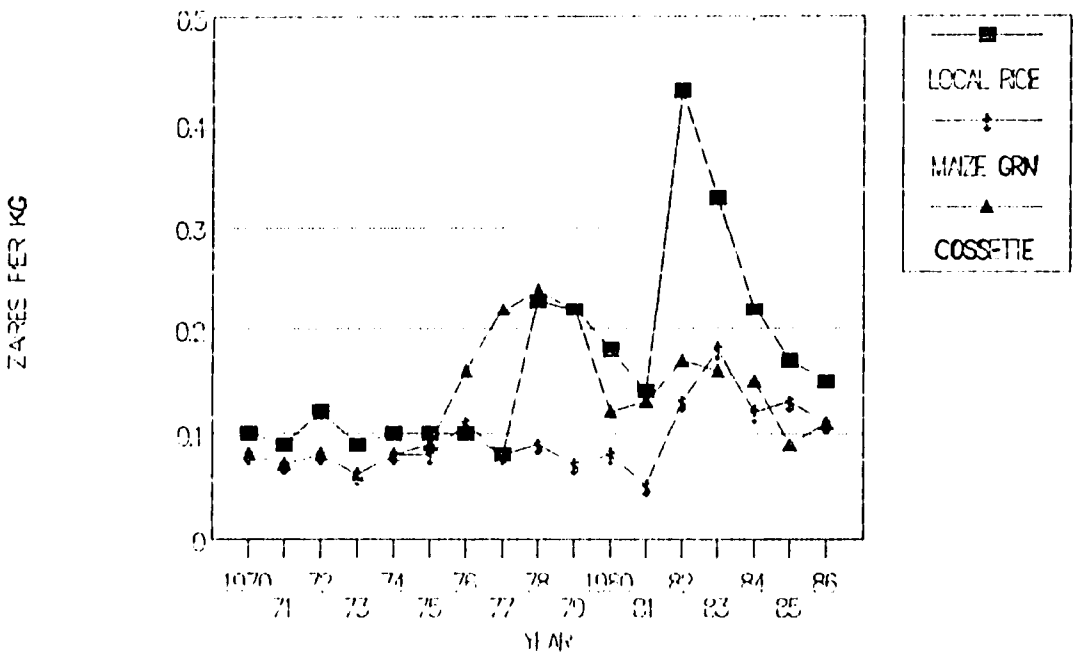
1) See 2; 7 Chapter 1.3 p9, Chap 7 p 374; Chap 9, p421; 8 p 12-19; 9, Resume for policy recommendations at government level and part 3 : Causes of (Ag Sector) Performance and Recommendations.

FIGURE 4

REAL PRICE:RICE,MAIZE,MANIOC KINSHASA MARKETS,1970-1986



Source : Annex 3

Problem One : Profitable Production (Zone de Bumba)

Estimated maize acreage was 19,660 Ha (5,p9). Estimated seeding rate is 30 Kg per Ha. Therefore, estimated requirement for improved seed varieties would be a minimum of 589,800 Kg or roughly 600 tonnes for the Zone of Bumba alone. At roughly 120 Z/Kg (See 12 for some estimated input costs), this would cost Z 72,000,000 (at 300 Z/$ = $ 240,000) if the seeds were available. If we assume a total cost of production for 1 ha of maize using 300 Kg fertilizer (50 Z/Kg), 260 man days at 100 Z/md, at 50,000 Z. We then assume a yield of 1500 Kg/Ha valued at 1300 Z/90 Kg sac or 14.4 Z/Kg, the returns would be around 22,000 Z for a net loss of 60 % !

Using two fertilizer costs : 50 Z/Kg and 100 Z/Kg, and prices as mentioned above, the traditional farmer buying improved seed at 120 Z/Kg would spend around 3,600 Z/Ha and would get back 7,200 Z. So, he would have a gross return of a 100 % or one Z for every one Z spent (Table 5). As soon as the farmer begins to purchase fertilizer, his/her cash costs begins to increase rapidly. If he/she can use family labour rather than hire labour at 100 Z/day, a substantial saving can be made. With good weather and good yields, the gros returns improve as long as the cost of fertilizer is kept low (see Gross Margin 1, Table 5). As the cost of fertilizer goes up to 100 Z/Kg, the gross return goes down below 100 % except for a yield of round 3 t/Ha.

The returns from using higher rates of fertilizer appear to remain attractive [1] at anywhere between 50 to 100 % (excluding any fixed costs such as depreciation on hand tools, interest rates assuming an opportunity cost, and any mechanical inputs for larger yields), if we only consider gros margins (Table 5). However, if we consider net margins, the reversel holds (Annexes 4 and 5). The traditional farmer produces less per capita but his cost of production is by far the most economic (Annex 5).

The only serious questions from the farmers point of view appear to be the high cash costs (as inputs of fertilizer and hired labour go up) and the availability of these inputs. There is a serious question as to both of these, especially the latter. The former may be available to larger farmers of importance in the locality but not to smaller producers.

But from the government's view point, the need is to stimulate the volume of production. What would be more effective: stimulate a few large producers with yields of 4 t/ha plus or numerous small producers with yields of 3 t/Ha or less ? The Zimbabwe experience would seem to suggest that the response from hundreds of small producers is forthcoming and should lead to some positive income distribution effects.

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1) As long as the fertilizer average price stays around 100 Z/Kg and other costs i.e. improved seed at 120 Z/Kg and hired labour at 100 Z/Man day, remain at that level. See Annex 4 for superior performance of traditional farmer. The published price was around 50 Z in 1987 (see 12, p3), or a subsidy of around 50 % for Kinshasa (8, p.16).

Table 5 : Estimated Gross Margins for Maize, Zone of Bumba 1988 ‡

Yield (kg/ha)	500	1500	2500	3000	4000	5000	6000	7000
Value (Z/ha) [1]	7200	21,600	36,000	43,200	57,600	72,000	86,400	100,800
Cash Costs								
Fertilizer 1.	0	0	5,000 (100 kg)	5,000 (100 kg)	10,000 (200 kg)	15,000 (300 Kg)	15,000 (300 kg)	15,000 (300 Kg)
2.	0	0	10,000	10,000	20,000	30,000	30,000	30,000
Seed [3]	3600	3600	3600	3600	3600	3600	3600	3600
Labour [4] (Mandays)	F (140)	7000 (70)	7000 (70)	7000 (70)	14,000 (140)	14,000 (140)	20,000 (200)	20,000 (200)
Subtotal 1.	3,600	10,600	15,600	15,600	27,600	32,600	38,600	38,600
2.	-	-	20,600	20,600	37,600	47,600	53,600	53,600
Gross Margin[5] 1.	3,600	11,000	20,400	27,600	30,000	39,900	47,800	62,200
%	100	104	130	177	109	120	124	160
Gross Margin[6] 2.	3,600	11,000	15,400	22,600	20,000	24,400	32,800	47,200
%	100	104	75	110	53	50	60	88

‡ calculated by Author

[1] Market price ville de Bumba July/August 1988, 1300 Z/kg = 14.4 Z/kg

[2] Assumed average price under 1 = 50 Z/Kg, and 2 = 100 Z/kg

[3] 30 kg/Ha at 120 Z/kg improved seed

[4] 100 Z/Mangay, F = Family (12,p3,11). Costs for timing casual labour.

[5] With fertilizer cost = 50 Z/kg

[6] With fertilizer cost = 100 Z/kg

From the question of seed producers, assuming a similar cost structure as for ordinary producers, the cash cost per kg of seed produced would run at 5 to 7 Z/kg when fertilizer costs are 50 Z/kg and would increase to 7 to 10 Z/kg when fertilizer costs increase to 100 Z/kg (Table 6). Since one can assume that fertilizer costs will go up, the small producer will produce seed more efficiently than the larger producer. We can see this by looking at the ratio of DM/KG, CI/KG and KG/CI (Annexes 4,5) where the small farmer is much more economically efficient than the larger producer.

Table 6 : Estimated Cost of Maize Production

Yield (Kg/ha)	500	1500	2500	3000	4000	5000	6000	7000
Cash Costs(Z/Ha)								
Fertilizer (50 Z/Kg)	3,600	10,600	15,600	15,600	27,600	32,600	38,600	38,600
Cost/kg	7	7	6.2	5.2	6.9	6.5	6.4	5.5
Fertilizer (100 Z/Kg)	3,600	10,600	20,600	20,600	37,600	47,600	53,600	53,600
Cost/kg	7	7	8.2	6.9	9.4	9.5	8.9	7.7

Again one can argue that many small producers, such as in the mission cooperatives of ADAZ or LCOMAMKO in Kumba could produce/multiply seed more cheaply than larger producers by not using fertilizer or hired labour.

If this were true, one could support a policy of encouraging seed multiplication by many small and varied producers. In Shaba, there are presumably private producers, as there are in other regions, supported by BUNASEM.
A further advantage of this approach would be to facilitate the diffusion of these improved seeds throughout the zone.
While the degree of seed purity and quality would probably be lower the overall cost of production and diffusion would probaby also be lower than using special government operated seed multiplication farms.

In any case, an estimate was made regarding additional hectarage of maize required to produce certain tonnages of improved seeds (annex 6). Assuming that 7,000 tons of seed were required, 570,000 Ha would be needed assuming an average yield of 700 Kg/Ha. When the average yield was estimated at 1500 Kg/Ha, additional area required dropped to 267,000 Ha.

Policy Option

The appropriate policy is therefore to encourage production and adoption of improved seeds that yield more with current traditional methods. It is doubtful whether compsite or hybrid seeds would be successful at this time except in clearly defined areas. The use of fertilizers should be discouraged unless the rate of subsidy can be maintained.

C) Marketing

As of July 1988, small traders apparently could make a reasonable profit of roughly 30 % between rural areas and the city of Kumba (table 7). Any rise in transport costs and/or storage costs would reduce this margin. The assumption made here was that there were no storage costs.

Between Bumba and Kinshasa, the small trader apparently could also make a profit of roughly 160 % (Table 8). For every expenditure of 1 Z, he might earn 2.6 Z. In terms of margins, his cost to the dock at Kinshasa might be around 21 Z/Kg. If he sells at 50 Z/Kg (the market price was an average of 56 Z/Kg in July 1988 [1]), he would have earned roughly 29 Z/Kg or 160 % return on his costs. Other economic costs such as subsidized transport fuel costs would need to be considered to help explain this high margin.

Table 7 : Marketing of Maize from Bokata to Bumba, August 1988 *

Item	Cost/Price	Comments
Price to producer (Z/Kg) Transport (Z/Kg)	8.9 2.2	800 Z for 90 Kg Sack 200 Z/sack or roughly 1.3 Z/Km
Total	11.1	
Sale price (Z/Kg)	14.4	1300 Z/ 90 Kg
Difference (Z/Kg)	3.3	
%	30	3.3/11.1 x 100

* The trader has been assumed to provide empty sacks. If this is not the case, sacks cost 200 Z each or a further 2.2 Z/kg. The smaller margin would favour the larger trader.

[1] INS. (4)

Table 8 : Maize Marketing between Bumba and Kinshasa, July 1988

Item	Quantity	Price/Value	Unit Price	Value Z
Cash Cost				
1. 90 mt	1000 Sacks	800 Z/90 Kg	8.9 Z/Kg	801,000
2. Empty sacks	1000	200 Z/Sack	-	200,000
3. Truck rental	1			70,000
Gas/Oil	10 Days	50 Km/Day, 5 l/day	2000 Z/Day	20,000
Driver	1	10 Days	1000 Z/Day	10,000
4. Workers	2	10 Days	500 Z/Day	10,000
5. Transport (Boat)	1000 Sacks	300 Z/Sack	-	300,000
6. Ticket + Food	1	10,000		10,000
7. Subtotal			15.8 Z/Kg	1,421,000
8. Weight Loss 5 % = 4,500 kg		9000 Kg x 15.8 Z/Kg		
Other losses 5% = 4,500Kg				142,000
9. Total Costs	81,000 Kg		19.3	1,563,200
10 Sale in Kinshasa	81,000 kg		50 Z/Kg	4,050,000
11 Benefit : Costs	4,050,000/1,563,200 = 2.6 : 1			
12 Margins : 50 - 19 = 31 Z/Kg or 160 % (31/19.3 x 100 = 160 %)				

We can thus conclude that there appear to be considerable profit to be made for the trader handling 1000 sacks between Bumba and Kinshasa. The margin appears to be much less from rural areas into Bumba. One can argue that this is due to insufficient transport services, a shortage of containers and the relatively high cost of transportation.

Policy alternatives would need to address these problems. Any production increases due to improved seeds would create an even worse situation.

Policy Option

In spite of severe marketing constraints, profits are being made. Any policy that encourages the activity of small traders should simplify the marketing process. Greater competition among traders should favour the producer. Given current availability of transport, storage and credit, the role of large traders is crucial to the flow of production in the marketing system.

CONCLUSIONS AND RECOMMENDATIONS

The main policy issues addressed were :

(1) Given the extent of apparent deficits in supply in urban areas, the growing demand for maize in beer production and the constraints in the marketing system there should be some potential for further imports at the current or even higher level without causing a negative effect on local production in short term.

(2) The probability of local production meeting estimated human consumption demands by the year 2000 appears quite high should production in ongoing and new projects in Shaba and elsewhere have the expected results. However, there will be a growing demand for maize as livestock feed as well as for by products such as starch and syrup. These conflicting demands need to be studied in more detail.

(3) Given the relative low cost of maize imports, there might be a political argument for increasing imports in short term in order to lower the urban price. However, there is some evidence as seen by the small increase in real maize prices in Kinshasa markets, that supply (especially in Shaba) may in fact be larger than reported by official statistics. Therefore imports could be increased only so as to cover the increase in urban demand. These estimates remain to be considered.

(4) Per capita production appears to have been stagnant in spite of government projects. An effort will be required to obtain more accurate data. At the same time, efforts to increase the supply and adoption of improved seeds that yield more under traditional methods should be strengthened.

(5) Even with current subsidized costs of fertilizer, the use of fertilizers immediately causes profitability to decrease. However, use of fertilizers appears profitable. This is true without considering the question of unavailability of fertilizers in most places. The widespread use of fertilizers does not appear to be a pratical possibility in the short term. Estimates of costs and returns to production need to be made using the real cost of fertilizer to the farmer who is not subsidized by a government or private project.

(6) The cost of production per kg of maize produced was roughly 4 to 9 times lower for the traditional farmer than for the same farmer using improved subsidized inputs. Small farmers should therefore be encouraged to continue low cost production.

(7) Marketing of maize is profitable in spite of contraints. The encouragement of small traders should ensure continued attractive producer prices.

(8) However, given current concentration of local transport among a small number of large traders, and shortages of credit, the role of large traders in the flow of production from rural to

urban areas is crucial. Hence the impact of government policies on these traders must be known.

List of References

1. Bank of Zaire. Annual Reports. 1970-1987.

2. Bureau Analyse Economique. Production et Commercialisation du Mais au Zaire. DSPA/ SEP. Département de l' Agriculture et du Développement Rural. Kinshasa, Juillet 1986.

3. Bureau de Planification Agricole. Region du Kasai-Oriental. Etude Regional pour la Planification Agricole DSPA/ SEP. Département de l' Agriculture et du Développement rural. Kinshasa, Septembre, 1986.

4. Bureau de Planification Agricole. Etude régionale : Région du Shaba. DSPA/ SEP. Département de l' Agriculture et du Développement Rural. Kinshasa, Septembre 1985.

5. Division de Stratégie et Planification Agricole, Analyse Sommaire des Principales Contraintes au Développement de l'Agriculture Zaïroise. S.E.P./ Département de l' Agriculture et du Développement Rural. Kinshasa, Janvier 1988.

6. Division de Stratégie et de Planification Agricole. Situation Actuelle de l' Agriculture Zairoise. DSPA/ SEP. Département de l' Agriculture et du Développement Rural. Kinshasa, Janvier 1987.

7. Donnay, J. et AL. Etude d'une Stratégie de Développement de la Filière Riz au Zaire. Rapport provisoire. Kinshasa, Mars 1987.

8. Greene. Brook A. Selected Policy Issues: Rice. BAE/ SEP. Dépt. de l'Agriculture, Kinshasa, December 1988.

9. I.N.S. Indice officiel des prix à la consommation des ménages de Kinshasa. Kinshasa, Juillet 1988.

10 Les Moulins Artisanaux dans les Centres Urbains. Dépt. de l'Agriculture, Kinshasa, Mai 1983.

11 P.N.R. Rapport Annuel du Programme National de Riz. Bumba/ Loeka 1987. PNR, Ville de Bumba 1988.

12 SEP. Estimation des coûts de production des principales cultures vivrières. Département de l' Agriculture. Kinshasa,Juillet 1988.

13 World Bank. Memorandum sur le Secteur Agricole. Département des Pays des Grands Lacs et de l' Ocean Indien, Bureau Régional Afrique. Kinshasa. February 2, 1988.

Annex I : Selected Consumer Prices, Kinshasa, June '87 - July '88 ‡ (Z/Kg)

Month/Product	Current Price			Index ¹⁾	Real Price		
	Local Rice	Imported Rice	Maize Grain		Local Rice	Imported Rice	Maize Grain
June' 87	44	71	24	-	-	-	-
July	45	63	26	100	45	63	26
August	48	59	36	101.8	47	58	35
Septeaber	44	58	40	103.4	42	56	39
October	50	56	39	103.4	48	54	30
November	50	63	54	104.5	40	60	52
December	54	70	44	125.6	43	56	35
January '88	45	80	52	133.2	34	60	39
Febuary	78	80	56	134.9	58	59	42
March	120	142	52	137.9	87	103	38
April	99	106	45	150.6	66	70	30
May	90	112	40	160.7	56	70	25
June	129	155	45	164.0	79	94	27
July	130	152	56	167.7	78	91	33

‡ Source : 3 Real prices calculated by Author

¹⁾ Black Market Exchange Rate (4) Index calculated by Author.

Annex 2 : Average Monthly Real Price of Maize Grain & Flour, Kinshasa 1987/88 ''

	Indice Général	Maïs Grain PC Z/Kg	Maïs Grain PR Z/Kg	Maïs Farine PC Z/Kg	Maïs Farine PR Z/Kg
'87 January	177,7	26	14.6	39	21.9
February	209,4	35	16.7	59	28.2
March	246,5	26	10.5	48	19.5
April	263,5	24	9.1	46	17.4
May	263,7	22	8.3	48	18.2
June	265,3	24	9.0	44	16.6
July	266,8	26	9.7	45	16.9
August	269,5	36	13.4	67	24.9
September	271,6	40	14.7	68	25.0
October	275,0	39	14.1	82	29.8
November	291,3	54	18.5	81	27.8
December	295,7	44	14.9	81	27.4
'88 January	312,8	52	16.6	95	30.4
February	335,9	56	16.7	108	32.2
March	351,7	52	14.8	94	26.7
April	378,9	45	11.9	217	57.3
May	399,1	40	10.0	100	25.0
June	441,9	45	10.2	104	23.5
July	441,9	56	12.2	95	20.6
August	477,9	67	14.0	103	21.6
September	499,3	74	14.8	115	23.0
October	516,9	83	16.0	146	28.2
November	548,2	96	17.5	158	28.8
December	574,2	93	16.2	161	28.0

'' INS : Indice Officiel des Prix à la consommation des Ménages à Kinshasa (100 = 1985) 1987 - 88
Av. for 1987 = Indice 258 ; Av. PC = 33 maize, PR = 12.8 Maïs PC = 59 Farine PR = 22.9 Farine
Av. for 1988 = Indice; PC = Maize, PR = Maïs PC = Farine PR = Farine PC = Prix Courant
PR = Prix Réel= PC/Indice

Annex 3 : Local and Real Price of Rice, Maize, and Manioc , Kinshasa 1970 - 1986

Year	Current Price Z/Kg [1]				Index GNP [2] 1970 = 100	Real Price Z/Kg			
	Local Rice	Imported Rice	Maize	Manioc Cossettes		Local Rice	Imported Rice	Maize	Manioc Cossettes
1970	0.10	0.36	0.08	0.08	100	0.10	0.36	0.08	0.08
1971	0.10	0.48	0.08	0.08	111.9	0.09	0.43	0.07	0.07
1972	0.10	0.67	0.10	0.10	123.3	0.12	0.54	0.08	0.08
1973	0.15	0.90	0.10	0.10	159.1	0.09	0.56	0.06	0.06
1974	0.20	1.22	0.15	0.15	192.4	0.10	0.63	0.08	0.08
1975	0.20	1.68	0.15	0.18	199.3	0.10	0.84	0.08	0.09
1976	0.30	2.30	0.32	0.47	290.8	0.10	0.79	0.11	0.16
1977	0.30	3.13	0.32	0.86	391.8	0.08	0.80	0.08	0.22
1978	1.20	4.26	0.48	1.29	526.8	0.23	0.81	0.09	0.24
1979	2.30	4.73	0.74	2.34	1052.0	0.22	0.45	0.07	0.22
1980	3.00	5.22	1.28	1.95	1640.9	0.18	0.32	0.08	0.12
1981	3.20	10.42	1.15	2.79	2217.5	0.14	0.47	0.05	0.13
1982	12.00	12.87	3.50	4.60	2787.1	0.43	0.46	0.13	0.17
1983	17.78	27.02	10.00	8.87	5401.1	0.33	0.50	0.18	0.16
1984	21.05	26.10	11.68	14.45	9473.6	0.22	0.28	0.12	0.15
1985	28.72	28.22	18.40	13.12	14355.0	0.17	0.20	0.13	0.09
1986	26.72	32.81	19.80	19.03	18019.0	0.15	0.18	0.11	0.11

1) 1970-74 from Archives, Div. of Statistics, Dep. of Agriculture; 1975-81 from pp 51,52
Etude sur la compétitivité Fev. 1987; 1982-87 from INS, notes sur les prix, Rapports trimestriels 1982-87

2) Banque du Zaire (6). Calculated from total of (GNP) PIB.

ANNEXE 4 :

ESTIMATION DE REVENU D'UN PRODUCTION DE MAIS GRAINE BUNDA 1988.-

	PRECISE ‡‡ 1		PRECISE ‡‡ 2		PRECISE ‡‡ 3		
NOMBRE	SAISON	COMMENTAIRE	SAISON	COMMENTAIRE	SAISON		COMMENTAIRE
1. VARIETE	LOCALE	PLUVIAL	AMELIOREE	PLUVIAL	(1) AMELIOREE	(2)	PLUVIAL
2. PRODUCTION (Kg/Ha)	730	(19,p 11)	1.500		3.000	5.000	11,p60 - 71
3. VALEUR (Z)		10 Z/Kg	15.000	10 Z/Kg	30.000	50.000	10 Z/Kg
DEPENSES MONETAIRE (DM) 4. SACS	270	8 Sacs 200Z/SAC/6 : 90 Kg/Sac	530	16 Sacs 200/6	1.100	11.000	33 Sacs à 200Z /Sac/6
5. SEMENCES	-	30 Kg; apagné	4.200	35 Kg, 120 Z/Kg ACHETE	4.200	4.200	35 Kg à 120 Z/ Kg ACHETE
6. ENGRAIS	-	-	-	-	15.000	15.000	300 Kg à 50Z/Kg
7. MAIN D'OEUVRE	-	FAMILIAL	-	FAMILIAL	7.500	7.500	150 HJ; 1/2 FAMILIAL à 100 Z/HJ
8. PHYTO	-	-	-	-	500	750	2 LITRE à 250 Z/L
9. DM / Ha	270	-	4.730	-	27.800	38.550	
10. MARGE GROS	7.030	VALEUR - CV	10.270	-	2.200	11.450	
11. MG/Kg	9,6	7.030 / 730	6,8	10.270/1500	0,7	2,3	2.200/3.000
AUTRES COUTS 12. OUTILLAGE	250	(H) (H) (H) MACHETE, HOUE, HACHE, 1500/6 = 250 Z/SAISON	250 4.815	H,H,H,=250Z/S 50% DE CV	350 13.900	450 (19.270)	IH,IH,IH,IC COUPE 2100/6=350/SAISON 50% DE CV
13. INTERET	135	50% DE COUTS VARIABLE	5.065		24.250	(19.720)	
14. SOUS-TOTAL	385		5.065		24.250	19.720	
15. COUTS TOTALE (CT)	655		9.795		52.050	58.270	
16. MARGE NET (MN)	6.645	7.300-655	5.205	15.000-9795	- 22.050	(- 8.270)	300.000-52.050
17. MN/Kg	9,1	6.645/730	3,5	5.205/1.500	- 7,4	(- 1,6)	-22.050/3.000
18. DM /Kg	0,4		3,2		9,3	7,7	
19. CT/Kg	0,9		6,5		17,4	11,7	
20. Kg/Ct	1,1		0,2		0,06	0,08	

Annex 5 : Rentabilité de maïs, Zone de Bumba, 1988 (Par Ha, par Saison).

Semences	Etude n°	Type[1]	Rendement (Kg/Ha)	Dépenses Monétaires (DM)	Marge brute/kg	Marge nette/kg	Kg/tête [2] par Ha	KG/DM	DM/KG
Locales	9	Pluvial VL	730	270	8,5	8	90	2,7	0,37
Locales	10	Pluvial VVB	730	2.230	11,3	9	90	0,33	3,0
Améliorées	11	Pluvial +SA,VL	1.300	3.600	6,1	4,4	160	0,36	4,4
Améliorées	12	Pluvial +SA,VVB	1.300	6.600	9,3	7,3	160	0,20	5,1
Améliorées	13	Pluvial SA,E,VVB	3.250	41.000	1,8	- 5,1	400	0,08	12,6
Améliorées	14	Pluvial SA,E,VVB	5.000	56.320	3,1	- 3	625	0,09	11,3

[1] VL = Vendu localement; VVB = Vendu dans la ville de Bumba; SA = Semences améliorées; E = Engrais.

[2] Supposons 8 têtes par ménage.

Source : Brook A. Greene, Estimation du Revenu de Maïs et Riz, Lieu Selectionné, Zaire, 1988. (Rapport en préparation).

ANNEXE 6

L'ESTIMATION DE PRODUCTION DES SEMENCES AMELIOREES DE MAIS (TONNES).-

DEFICIT t (000)	Ha (000) 1) SUPERFICIE NECESSAIRE				SEMENCES NECESSAIRES (t) 2)			
	A	B	C	D	A	B	C	D
50	71	50	33	25	2.500	1.750	1.170	815
100	143	100	67	50	5.000	3.500	2.340	1.750
200	286	200	133	100	10.000	7.000	4.680	3.500
300	429	300	200	150	15.000	10.500	7.020	5.250
400	571	400	267	200	20.000	14.000	9.360	7.000

Chiffres Arrondis

1) Le rendement moyenne, variété local sans engrais, était entre 725 - 1.600 Kg/Ha (moyenne de toutes les régions est entre '77 à 84); le rendement moyenne variété améliorée, sans engrais, était entre 1.150 et 1.870 Kg/Ha (moyenne de Kasaï-Oriental et Shaba, 1979 à 83). (PNE, Zaïre : Rapport Intérmaire, ONUAA, Rome 1985, p.60-71).

Donc, A = Rendement Moyenne de 700 Kg/Ha

B = Rendement Moyenne de 1.000 Kg/Ha

C = Rendement Moyenne de 1.500 Kg/Ha

D = Rendement Moyenne de 2.000 Kg/Ha

2) On suppose 35 Kg/Ha

Annex 7 : Abbreviations Used

BAE	:	Bureau Analyse Economique
BNMASEM	:	Bureau National de Semences
CT	:	Coat Total = Total Costs
DM	:	Dépenses Monetaires = Cash costs = Variable costs excluding cost of credit
DSPA	:	Division de Stratégie et Planification Agricole, SEP
Ha	:	Hectare
INS	:	Institut National de Statistiques
Ln	:	Natural Logarithm
MG	:	Marge Gros = Marge Brute = Gross Margin, Value of production minus variable costs
MN	:	Marge Nette = Net Margin, Value of production minus total costs
MT	:	metric tonne = t
PNE	:	Projet National Engrais
PNR	:	Projet Nation Riz
M	:	Million U.S dollars
SEP	:	Service d'Etudes et Planification
Z	:	Zaire, Unit of currency, $US 1 = 112 Z Average 1987, $US 1 = 130 Z in Dec. 1987 = 262 Z in Dec. 1988.