A SYSTEM OF SUSTAINABLE AGRICULTURE FOR BARBADOS AND THE CARIBBEAN IN THE 21ST CENTURY

by

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When I was asked to prepare a paper on sustainable agriculture for Barbados, I did indicate that I would have to broaden the topic, the reason being that I do not think that agriculture of any individual Caribbean member state has much of a long term future in the next century: especially in the context of the new economic order. I do believe that as a group or trading block the Caribbean region can become economically competitive.

INTRODUCTION

During the 19th and 20th centuries the major European powers of England, France, Germany, and Turkey found it necessary to locate additional markets for their finished goods. European investors used their private wealth and capital to aggressively pursue markets outside of Europe. The individual National governments had to provide their citizens with security and protection for their foreign investments. This state security facilitated commerce. The European governments all justified their support to private capital on the basis of the need to spread Christianity and civilization to the heathen parts of the world. The marriage of the three C's - Commerce, Christianity and Civilization (Western culture) had begun.

The finished products of cotton fabrics, iron pots, pans, railway tracks and engines etc. in many cases replaced indigenous products which were easily renewable and economically sustainable in non-industrialised countries.

The colonies paid for these European products with gold and silver which were used to adorn the castles of the nobility (investors), the churches and cathedrals of the European Christian clergy. The colonized states provided the human resources (labor and slaves) needed to produce palm oil rubber, used in the machines and factories in the industrialized states of Europe and spices for the preservation of meat and other foods and tea, coffee, sugar, to provide the beverages consumed by the general population of Europe. This pattern of colonization consisting of commerce and agriculture was enforced and maintained by the use of arms.

In the 21st century, little would have changed except that the need for colonies no longer existed. The protection and sectoring of the investments of the industrialized states in foreign lands could now be easily effected through the rapid means of information, communication and the easy transfer and transport of men and materials. The modem "beyond the horizon" weaponry available to these industrialized states ensures compliance.

The constant factor however is that agriculture of the next century will be driven

as it was in the past by the need for market share and market conditions. The rules of the New World order for trade have already been firmly established and in my view the most important conditions for commerce in the 21st century are:

- Trade liberalization and the protection of private capital by all states; and
- The internationally determined and enforceable system of tariffs and preferences and the gradual elimination of subsidies on traded commodities (the GATT agreements).

It is within this framework, that any projections of sustainable Caribbean agriculture must be placed. I am however not convinced that enough of our present leaders and planners of the agricultural economy have come to the full realization of all the implications of the international trade environment.

THE AGRICULTURAL PRODUCTION ENVIRONMENT OF THE CARIBBEAN

Land based agriculture in the Caribbean is severely restricted by the limited availability of land suitable for arable crops. In the island states arable land in the Class 1-3 land use categories, (these land classes are lands that are arable and mechanisable) constitute less than 20 percent of the total arable land area. In the continental countries of Guyana and Belize, there are a comparatively high proportion of Classes I to 3 land categories available. The soils of these locations tend to be highly infertile, because of their physical and chemical characteristics. Even where such lands can be used for cattle or livestock production, the stocking rates are low and the animal carrying capacity are usually in the order of one animal per two hectares of land. The Leeward Islands have limited available for domestic consumption, industry, and agriculture. At the higher population densities, the Windward Islands, that now are water countries, could some time in the next century need water conservation and anti-pollution measures. Barbados is now beginning to face this problem of limited fresh water resources; when this resource becomes limited, agriculture is first to suffer. In the next century economic and industrial development could be restricted by water availability. Water (river) pollution problems could become serious encumbrances to further economic growth.

The continental states all have to face drainage and land reclamation problems and pay high costs for the construction of such infrastructure, as well as the recurring high maintenance costs.

The impact of increased foreign television in the region over the last ten years has resulted in a change in dietary habits and consumption patterns of the native populations. Consumption has shifted away from the traditional food crops to wheat and soybean-based food products of the northern temperate states.

Local food and root crops of the Caribbean with an export potential may find that the shrinking domestic consumption patterns will lead to a diminution of their export prospects.

Free and open market competition implies that price support, protected markets and subsidies to agriculture will become policies of the past. The market protection and

trade policies of LOME and other such trade agreements will, in the very near future, be discontinued for all Caribbean exporters.

The Caribbean states have no significant fossil fuel deposits. In the region, there are no cheap sources of energy that can be used for manufacturing and processing of any significance in a competitive environment and on a world scale.

Foreign international funding organizations have tried to dissuade Caribbean governments from giving adequate support to agricultural research and, in some cases, have implied that locally based agricultural research should be discontinued. At the same time, these foreign advisers recognize that the enforcement of the Agreement of Intellectual Property Rights will place the Caribbean farmers in a highly uncompetitive position. Subsequent transfer of these technologies to the Caribbean would require significant outflows of foreign exchange.

The Caribbean area must move away from its mendicant posturing in resolving problems of trade and agricultural marketing and to recognize that prices in the future will be determined almost exclusively by free market conditions and the manipulation of some markets by the industrialized countries.

If we in the Caribbean region are to have any place in the international markets for our products, our research and training institutions must solve and remove those hindrances which now make us uncompetitive in these markets.

ARE THE OLD SYSTEMS SUSTAINABLE?

A brief examination of the performance of sugar in Barbados shows that, 25 years ago, this industry contributed twice the value to the Gross Domestic Product of Barbados as the non-sugar production.

Within the last six years non-sugar agriculture has been contributing twice as much to the GDP in real terms, as the sugar production. It is interesting to examine at the micro level what has been taking place in the sugar and non-sugar agricultural sectors on estates in Barbados. The data used in this analysis are extracted from a report published in 1989 by the accounting firm of Coopers and Lybrand. This report consists of the accounts of thirty-three sugar estates out of a total of 110 estates in Barbados. The data covers the estates in all of the ecological categories identified by the Barbados Sugar Industry. **Table 1** provides revenue and expenditure data from five randomly selected estate categories.

Table 1: Revenue and expenditure data from five Sugar Estate Categories.

		Category	*of*	*Estates*		
Per	$	0	E	G	K	L
Tonne	Revenue	80.5	72.3	86.0	78.3	100.3
Cane	Expenditure	100.7	103.9	100.4	120.9	133.9
Per	$	0	E	G	K	L
Tonne	Revenue	707.6	635.7	756.1	688.5	882.
Sugar	Expenditure	885.4	950.6	882.8	1062.7	1116.9

The "per tonne cane" data shows what the estates should receive from the sugar factory for their cane supply to cover their total field cost. The "per tonne sugar" data shows the proportion of sugar revenues that would cover the field costs.

If we assume that the factory cost of sugar cane into sugar is about thirty percent of the field cost, we can conclude that the break even cost for sugar production would be in excess of $1300.00 Bds. The policy of the Europeans is to maintain the cost of industrial sugar at a comparatively low price so as to remain competitive in the marketing of sugar based products. This makes it unlikely that the price for sugar in the European market is going to rise above the current level. There are mechanisms in place, such as "trigger prices", "A, B, and C sugar prices" which are meant to ensure stability in market supply and price levels. Furthermore, Western European investment capital, factory and field production technologies, when applied to Eastern European production, will expand sugar output and make the eastern European industries more efficient. On the other hand, eastern European standards of living and their incomes will rise much more slowly than sugar output. Consequently, European sugar supply will grow faster than consumption, and prices will either go lower or be maintained at the current level. There seems to be no realistic opportunity for Caribbean sugar exports to be expanded in Europe.

The payment of crop subsidies and price supports to sugar and other tradable commodities will in the next five years be severely curtailed. So the outlook for sugar exports from the Caribbean, to Europe and North America, seems particularly bleak.

It is useful to examine the performance of non-sugar commodities in the sugar cane production systems of Barbados, given the fact that the importance of rotational crops in these systems has been consistently downplayed. Recently, the management of the Barbados Agricultural Management Company operated estates drastically curtailed the production of rotational crops on these estates. Table 2 details the cost structure of the field production on two categories of estate in Barbados. The data used in this table are again taken from the Coopers and Lybrand report of 1989.

Table 2: Cost Of Production Of Sugar Cane And Non Sugar Crops On A Typical Category E And Category L Estate.

Cost Items	Category "E" Estate Per Tonne Cane $	%	Category "L" Estate Per Tonne Cane $	%
Wages	44.4	43.0	52.0	38.0
Salaries	9.3	10.0	9.6	7.0
Field Supplies	10.5	10.1	18.5	13.4
Transport/Harvester	0.0	0.0	0.4	0.3
Cane Loader	1.4	1.4	1.7	1.2
Trailers	2.6	2.5	1.3	1.0
Other Equipment	14.6	14.1	20.8	*15.0*
Rentals (Equipment)	9.9	9.5	11.9	8.7
Building Maintenance	3.7	3.6	2.0	*1.5*
Road Maintenance	0.1	0.1	0.0	0.0
Water Facilities	0.6	0.6	4.2	3.1
Taxes, Insurance, etc.	4.6	4.4	*5.5*	4.0
Bank Interest	2.2	2.1	9.6	7.0
TOTAL	**103.9**	**100.**	**137.5**	**100.0**

In order to make the comparisons between sugar and non-sugar that follows in Tables 3 and 4, wages, field supply, specific expenses as appropriate to sugar cane or non-sugar crops are used in this analysis. These costs constitute about 70 percent of the total cost of production, and the other field costs are not easily separated and applied to the appropriate commodity.

The expenditures on rotation crops are taken as the costs of wages from planting to reaping, field supplies and chemicals and specific expenses such as seeds, irrigation and packaging materials.

The sugar cane expenses are taken as wages from planting to reaping field supplies, chemicals and specific expenses such as cane loaders and trailers. The first column in this table represents the money spent on that item. The second column represents the percentage of the costs of this item in relation to the costs of the items used in this comparison; the third column represents the percentage of this item costs in relation to the total expenditure on the estate.

Table 3 ESTATE COMMODITIES

		E	G	H	J	K	L	M
Revenue Per Tonne Cane	Sugar Cane	72.3	75.5	78.2	78.0	78.3	80.3	81.3
Revenue Per Tonne Cane	Non - Sugar Crops	7.3	8.7	20.4	20.5	14.2	16.6	12.8
Total Revenues	Sugar and Non-Sugar	79.6	84.2	98.6	98.5	92.5	96.9	94.1
Percent Revenues	Non- Sugar Crops	9.2	10.3	20.7	20.8	15.4	17.1	13.6

Table 4 Selected Expenditure per tonne on two categories of Estates for Sugar and Non-Sugar commodities

Items		Category "E" Estate			Category "J" Estate		
		Cost $	%	% of Total	Cost $	%	% of Total
Wages	Sugar	317.9	80.7	33.1	251.6	63.9	26.2
	Non-sugar	7.6	1.9	0.8	45.4	11.5	1.2
Feed Supplies	Sugar	89.8	97.4	9.5	130.1	86.1	13.5
	Non-sugar	2.4	2.6	0.3	20.9	13.8	2.2
Specific Expenses	Sugar	35.2	-	3.7	12.7	-	1.3
	Non-sugar	0.1	-	0.01	15.4	-	1.6
Percentage Contribution of Non-Sugar To Total Revenues	9.2			20.8			

This brief analysis shows clearly that non-sugar crops are important to the survival of the sugar industry of Barbados. The Category "E" Estates spend about 2 percent of their total expenditure on non-sugar crops and obtain over 90 percent of revenue from this source.

The Category J Estates spend about 6 percent of expenditure on non-sugar crops and obtain 20 percent of their total revenue

from this expenditure. All categories of estate fall within these two data boundaries implying that non-sugar crop revenue is 3 to 4 times the expenditure on these commodities, while the revenue yields of cane to this expenditure are all less than 1.0. Additional uses of sugar cane by-products such as cane tops could possibly yield to a ratio just greater than one.

One can conclude therefore that non-sugar agriculture in Barbados is viable both within and without the sugar cane system of production and that the sugar cane system can only be made viable if a higher percentage of rotational crops and livestock are included in the system. It is important to realize that financial viability is the first and primary condition for system sustainability. In this regard, non-sugar agriculture in Barbados meets this condition.

The emphasis in the sugar industries in most countries is to treat sugar cane as a crop and to develop a wide range of products from this crop. It is essential for the Caribbean planners to follow the examples of Cuba and the Philippines, where the usage of sugar and sugar cane as being diversified and a wide range of products such as rum from cane juice, dietary fibre from bagasse, silage from cane tops, bagasse and molasses feed mixtures for ruminant livestock, and molasses fermentation products are being promoted.

Sugar cane, for example, is still a viable crop in Guyana, Belize and Jamaica, where the suitable land and water resources are readily available. In the other English speaking Caribbean island states of Barbados, Trinidad, and St. Kitts, sugar cane production for sugar export only is neither a financially viable option nor the best use of the land resources. The return to capital and operating costs is low, and the foreign exchange earning per acre of land resource used by this crop is lower than that of other crops with export potential.

In the Barbados case, (as well as the other sugar producing areas of the Caribbean) it is to be noted that a 20 percent increase in the sugar output in 1997 over the 1996 level resulted in less than a 5 percent gain in foreign exchange. The continuation of sugar cane needs to take into account the macro-economic reality in Europe, as referred to in the earlier section of this presentation.

A similar requirement for the re-focusing of the banana industries of the WINBAN countries is essential. Intensive production rather than the extensive production of bananas must become the method of production. Utilization of technologies of irrigation, fertigation and plant protection are all essential areas for improvement if the banana industry is to be competitive and successful. At the same time, the diversification of banana products for export utilization of plantains, figs, (apple-bananas) must be explored and the supporting research executed. It is unfortunate that the major problems faced by the banana exporters in 1997 should be the same as they were in the 1960's, these being latex staining, premature ripening and lack of uniformity of fruits. This implies that the research support to the banana industry was not very effective and implies the role which the University of the West Indies, the Caribbean Agricultural Research and Development Institute (CARDI), and other regional research organizations must play in making Caribbean agriculture competitive and sustainable.

AN AGRICULTURAL SYSTEM FOR SUSTAINABILITY!

None of the foregoing should imply that there is no future or hope for agriculture in the Caribbean. A complete rethinking of agriculture production systems is required. The emphasis of comparative advantage and competitiveness in niche markets should be the focus of all states in the region. The use and commercialization of the resource most abundantly available in the region has to be given the highest priority of development financing. It is for this reason that I am of the view that the present direction being taken by the various Caribbean governments in terms of agricultural development is fanciful and unrealistic.

In the eastern Caribbean from Antigua in the north to Guyana in the south, the marine resources available within the 200 mile Exclusive Economic Zone are abundant enough to support (for the next hundred years) the protein needs of the present and future population of the Caribbean; assuming of course that the population continues to grow at their present rates.

Added to these renewable and naturally sustainable fish resources, is the potential for utilizing the fresh water areas of Guyana and Belize for the aquaculture of commercial fresh water fish species when and wherever the opportunity arises. The in-shore areas of the island states can be similarly used for mari-culture of suitable marine fish species. The island states such as Barbados can only have a sustainable system if they conservatively and fully exploit these fish resources on two levels simultaneously.

Firstly, investment should be made in a small deep-sea fishing fleet consisting of factory ships that would serve as mother ships for the present fleet of smaller fishing boats presently operating. This concept was first articulated in the Caribbean food plan of the 1974-1976 period at the time of the oil crisis.

However, this approach to the utilizing of Caribbean natural resources was unfortunately never realized. It is possible for these ships during the period December to June to obtain their catch east of the Caribbean island chain and during the summer (hurricane season) July to November to fish on the waters of the southern Caribbean that is south of Trinidad. To effect this policy, it is absolutely necessary for the free access of Caribbean registered boats to the entire zone of economic influence and the removal of all legal barriers to Caribbean boats exploiting in a sustainable manner the resources of the region. It is obvious that none of this can or will occur except that there is a CARICOM cooperative agreement that recognizes that the waters of the Caribbean is an area of commercial economic resource which should be equally available to all member states.

It is only if this approach of utilizing the marine resources is taken that a model of sustainable agricultural development for the Caribbean be realized in the 21st century.

As a result of this strategy the Caribbean would become not only self sufficient in their human protein needs, but also self sufficient in non-ruminant animal protein needs without any over exploitation of the available resources. Any sources of fish and non-ruminant animal protein products which are being produced at competitive prices in the Caribbean would prevent the penetration of foreign products into the region and open the opportunity for some exports in the short term, particularly when population levels in the region are low.

The ruminant livestock industry is the most financially important aspect of livestock production in the region. In Barbados, the poultry industry has an annual value in excess of Bds.$85.1 million at wholesale prices. Of this value more than Bds.$59.2 million is local value added and about Bds.$19 million is imported feeds and medicines (Systems Caribbean Limited VAT Economic impact Study). The pork industry of Barbados has an annual value of over Bds.$20 million and a local value added of some Bds.$15 million. The foreign feed and medicine component is about Bds.$5 million Jamaica and Trinidad and Tobago have industries that are somewhat similarly structured to that of Barbados but very much larger. One can therefore infer the vital importance of a regional fish based source of feed for ruminant livestock in the Caribbean.

It can not be over-emphasized that the production of fish harvesting is directly related to technology. Therefore, if the Caribbean investors employ the best technology available, a regional deep sea fishing fleet will be immediately competitive with that of any other country, using similar technology. Fishing productivity is related only to resource availability and the technology of harvesting applied. The capital investment costs are similar for all investors.

The question that arises in my mind is to what extent the signed Shipriders Agreement will preclude the full exploitation of these valuable resources by Caribbean people?

It is to be noted that this first approach of using the available fish resources of the region is heavily energy dependent and should be considered as a medium term approach to the exploitation of this natural resource. The second approach of aquaculture and mari-culture is less energy dependent.

Many commercial species such as salmon, catfish and eels are cultivated usually for export and there are no reasons why Caribbean states cannot develop this type of commercial enterprise.

This policy and strategy for agricultural development would relieve the pressure on the limited land and water resources. Consequently, the problems of accelerated soil erosion, river pollution, and coastal water pollution, would be reduced or prevented. This reduced agriculture sector demand for the consumption of the land based natural resources of the Caribbean would permit a selective and discriminate use of these resources for alternative types of economic activity. The intensive production of high value crops in systems which combine high levels of technology application and high levels of labour and which yield high returns to capital and labour can be realized. The production of such high value crops as tropical flowers and tropical fresh fruit for export to niche markets readily comes to mind.

The production of some of the traditional crops such as rice, bananas, sugar cane and cocoa can and should be pursued in the short and medium term plan. However, the focus should be on increased productivity and reduced costs. The systems should employ the levels of technology that would lower the consumption of the land resources utilized. In this way, a greater degree of competitiveness can be realized within the Caribbean.

Research has to be done on improving the quality of those crops for which we have some climatic advantages. The use of

genetic engineering to solve the problems of Witches Broom disease of Cocoa and other similar disease problems in crops which cannot now be grown outside of the tropics. The solution to such problems should be the focus of our University-based research scientists .The use of all available technologies to enhance the desirable characteristics of our exportable commodities is essential to the Caribbean becoming and remaining market competitive.