# THE MAJOR CONSTRAINTS ON THE COMMERCIAL PRODUCTION OF CORN IN GUYANA

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## Introduction

There appears to be little need for the justification of a case for an increased production of corn *(Zea mays)* in Guyana and indeed the entire Caricom region. The successful expansion of corn production in Guyana is of importance not only to this country but to the entire region, as Guyana, along with Belize, are the only member states with adequate land mass for the production of corn for regional needs. In Table 1, the imports of corn into Guyana and other Caricom countries are presented. It is seen that in 1972, a total of 401.3 million pounds were imported into the region. If yields of 2,000 or 4,000 pounds per acre are assumed (and the first seems more practicable) an acreage of 200,650 or 100,325, respectively, has to be cultivated to meet present needs. I am unaware if forward projections of consumption are available for the entire Caricom region, however.

Table 1. Imports of corn into the Caricom region, 1972

| Country | Imports (million lb.) |
|---|---|
| Barbados | 8.5 |
| Guyana | 9.8 |
| Jamaica | 246.0 |
| Trinidad & Tobago | 137.0 |
| Belize | n.a. |
| E.C.C.M. | n.a.* |
| Total | 401.3 |

Source: Unpublished report, Caricom Secretariat.

n.a. = not available
* = not available, likely to be nil or negligible.

Traditionally, corn has been an integral part of a system of shifting cultivation by the country's farmers. The crop was and is usually grown on the banks or levees of the rivers and major creeks, where the soils are alluvial and relatively fertile. In a number of instances, the vegetation is of well advanced secondary forest. The crop is normally the first grown after land clearing and burning. Depending on the location, the second and third crop may be grown in association with other crops such as yams *(Dioscorea sp.)* and bananas or plantains *(Musa sp.)*. As expected, many improved agronomic practices are not followed and inputs such as irrigation, fertilizer and pesticides are not commonly available and/or utilised. In addition, the farmer

Table 2. Production of corn in the Caricom region, 1972

| Country | Production (million lb.) | % of Consumption |
|---|---|---|
| Barbados | 2.2 | 20 |
| Guyana | 6.2 | 31 |
| Jamaica | 8.8 | 4 |
| Trinidad & Tobago | 6.6 | 5 |
| Belize | 30.9 | n.a. |
| E.C.C.M. | - | |
| Total | 54.7 | 12 |

Source: Unpublished report, Caricom Secretariat.

generally cultivates only about 55 per cent of his holding [1]. Notwithstanding the fact that some land is consciously allowed to remain fallow this represents poor utilisation of this resource. One apparent reason for this under-utilisation of land is the physical and perhaps financial inability of the farm family to cultivate greater acreages.

Table 3. Annual production of corn in Guyana

| Year | Acreage (acres) | Production ('000 lb.) |
|---|---|---|
| 1964 | 2,800 | 2,720 |
| 1965 | 3,400 | 3,060 |
| 1966 | 2,650 | 2,387 |
| 1967 | 2,760 | 2,766 |
| 1968 | 2,200 | 2,990 |
| 1969 | 2,600 | 3,897 |
| 1970 | 3,150 | 4,100 |
| 1971 | 3,400 | 5,310 |
| 1972 | 3,650 | 6,200 |
| 1973 | 4,500 | 6,300 |
| 1974 | 5,000 | 6,000 |

In 1967/68 the Ministry of Agriculture prompted by the development of the Pioneer hybrids, embarked on the first attempt at 'large' scale production in the Black Bush Polder. The soil used in this area was typically that of a reef sand; it is of medium fertility but of excellent physical properties. These reefs are found as lenses throughout the coast of Guyana. This exercise, which was of a limited nature and never exceeded 100 acres per season, only lasted for about two years as it was soon recognised that the soil type was atypical and hence the experience gained could not be used for future corn production projects.

The Ministry, through the Government-owned Company, Global Agri. Industries Ltd., then shifted its attention in 1971 to the Intermediate Savannahs as the area for extensive corn production. This area is characterised by savannah vegetation and slightly rolling topography These, along with the excellent physical characteristics of the soils, make the area readily adaptable for large-scaled mechanised production. The soils are however acid, infertile and extremely permeable. There is, therefore need for large quantities of fertilizers and soil ameliorants. The rate of growth of this project has not been as fast as or spectacular as was anticipated (Table 4). However, the exercise has allowed the acquisition of invaluable experience, skills and knowledge that are required for the management of large-scale mechanised cultivation projects. The administration of this production exercise has now moved from the Ministry of Agriculture, proper, to the recently formed Agricultural Products Corporation. This Corporation will also be involved in producing corn in the heavily forested and mountainous North West Region where the soils are acid but more fertile than those of the Intermediate Savannahs.

In May, 1974, probably because of the limited success in the Intermediate Savannahs and Matthews Ridge, emphasis within the programme was placed on mobilising the traditional producer - the farmer. This programme, which to date has been quite successful, is based initially on utilising the existing technology of the farmer but giving him the means of utilising most, if not all, of his farm. The details of this programme have already been presented at this conference [2].

Table 4. Cultivation at Global Agri. Industries Ltd.

| Crop | Acreage Planted | | Corn |
|---|---|---|---|
| | Corn | Total* | (yield/acre) |
| 1970/71 | 605 | 802 | 1200 |
| 1971 | 350 | 1500 | 1500 |
| 1971/72 | 600 | 1080 | 2800 |
| 1972 | 1200 | 1515 | 2500 |
| 1972/73 | 604 | 764 | n.a. |
| 1973 | 650 | 1425 | n.a. |
| 1973/74 | 221 | 590 | 2700 |
| 1974 | 750 | 1100 | 2900 |

*Other crops grown were usually soybean, blackeye, peanuts and sorghum.

## Constraints

A number of constraints to commercial production have materialised over the years. These constraints can be divided into two broad categories - technical and managerial, although there is some overlap from one category into the other. From the onset, it is necessary to state that although the technical constraints are important, they are much less important than those of a managerial nature in preventing the rapid expansion of commercial corn production. Mastering of the managerial

practices is absolutely essential for the merger of all of the technical coefficients into a pragmatic, workable and profitable packet.

*Technical Constraints*

The location of the production areas provides the first constraint. In the Intermediate Savannahs, where the vegetation is of a savannah type and hence the land clearing costs are negligible, fertilization and irrigation costs are quite substantial.

In the North West Region, which is heavily forested, cost estimates for land clearing vary from G$150 to G$250. Perhaps, more important is the heavy capitalisation needed for the purchase of bulldozers and other land clearing equipment. The high and evenly distributed annual rainfall of the area limits the 'available' days for land clearing to between 90 to 120 days per year. For high annual acreages of land to be cleared, 'excess' machinery is needed to capitalise on these available days. Careful examination of the economics of mechanised corn cultivation is therefore essential. It is easily recognisable that none of the areas can be described as ideal.

Open-pollinated varieties, such as Charity and Deerfoot, have been traditionally grown by the farmers of Guyana. These varieties are very tall and well adapted to the extensive system of cultivation practised. They however appeared, at least under experimental conditions, to be responsive to better agronomic practices giving yields in excess of 3500 pounds per acre [3] . Further selection and breeding work of these varieties is suggested and is being carried out. The commercial hybrids, Pioneer X 304, X 306, X 306A, have been introduced, and have been used in improved systems of cultivation. These hybrids have not been accepted by the farmer primarily because their performance is much poorer than that of the traditional varieties on their holding. The introduction of these varieties into Guyana, at a time when the majority of producers were farmers, was probably a mistake. No variety should be realised unless it performs better than the existing varieties grown in the prevailing ecological conditions. This concept has been enshrined in the plant breeding programme of Guyana. More recently, emphasis has been placed on the development of composites and one variety, Tuxpeno, of Mexican origin, has been identified. Optimum plant populations for these varieties have been determined. Basically, varieties are available with yield potentials of 4,000 - 5,000 pounds per acre, but these potentials have not been realised under commercial conditions to date.

The fertilization needs of the corn-producing areas have been relatively well defined. Recommendations for the coastal area have been made by Chesney [4] and Shukla [5,p.136], those for the Intermediate Savannahs by Fletcher [6] and Chesney [7, p.139], and those for the North West Region, particularly Matthews Ridge by Chesney [8]. Further detailed work is however needed on the timing of application and the source of the micro-elements. Fertilizer recommendations for three selected areas are presented in Table 5.

Diseases have not been a major problem in corn cultivation in

Table 5. Fertilizer Recommendations for Corn Cultivated at Three Locations.

| Fertilizer type | Unit | Rate | | |
|---|---|---|---|---|
| | | Mon Repos | Matthews Ridge | Intermediate Savannahs |
| Lime | tons | 2.0 | 2.0 | 0.75 |
| Nitrogen (N) | lb. | 14.0 | 150.0 | 150 |
| Phosphorus (P) | lb. | 13 | 24 | 30-45 |
| Potassium (K) | lb. | 100 | 100 | 120 |
| Magnesium (MgO) | lb. | 20 | 20 | 30 |
| Fritted trace elements | lb. | 20 | 20 | 20 |

Guyana. Bissessar [9] has listed five diseases but none are of commercial value. However, in 1973 there was a serious outbreak of Southern leaf blight *(Helminthosporium maydis)* in the Intermediate savannahs. Rai [10] has listed two insects the fall armyworm *(Spodopitera frugiperda)* and the aphid *(Rhapalosiphum maids,* Fitch) as being of economic importance. He estimates that these insects can cause a potential loss in yield of 5 and 30 per cent in the riverine and Intermediate savannahs, respectively. However, chemical methods of control have been determined for corn grown under both farmer and large-scale systems of cultivation. Providing that the recommended insecticides can be applied at the correct time, insects are therefore not a serious limiting factor.

Whether it be on the riverine soils or those of the Intermediate savannahs or the North West Region, weeds become a very serious limiting factor after a few crops. To date, there is no published data on the quantitative losses caused by these weeds, but qualitative assessment indicates that these must be large. Both mechanical and chemical methods or a combination of both have been tried, but these have not resulted in total or (in most cases) workable control. One weedicide, atrazine, has given maximum control of most weed species. However, because of its high residual character and its toxicity towards legumes, its use is virtually limited to a monocultural system of cultivation. Recently, a few chemicals appear to be promising but these need further testing.

Once the crop has been grown, harvesting does not pose any serious problem. The timing of this exercise is not critical as the corn cob remaining on the plant can withstand rain without much damage. Harvesting is usually done by hand or mechanical harvester. The available harvesters are relatively efficient, causing minimal losses of grain; and efficiently operated harvester does about 30-40 acres per eight-hour day.

Post-harvest activities of drying, bagging and shipping can be a problem. In the 'organised' cultivation areas, such as in the Intermediate savannahs and the North West Region, drying is easily performed by the installation of electrical driers. In the 'disorganised' areas populated by the farmers this is not so simple. Firstly, the farmers have to be encouraged to organised themselves in groups large enough to be able to use shellers and driers of appropriate capacity; these are then installed on a communal basis. In some areas, this approach has been successful.

In all the corn production areas, transportation is by water rather than road. The normal shipping facilities have not been geared to handle, in a reasonable period of time, the quantum of corn that has been produced recently. The alternative, chartered shipping, is not always available. The lack of transportation causes the crop to be stored at the sites of production for protracted periods under poor conditions. Loss from insect and fungal damage can be quite high. As the availability of adequate shipping does not appear possible in the near future, alternative systems have to be devised. A solution to this is to build proper storage facilities, e.g. bins, at the production sites. The crux of the matter is that the responsibility for production does not stop until the produce is in the hands of the purchaser. For 'new' crops, the cultivation aspect of the exercise is perhaps easier

to achieve mainly because the post harvest activities, the facilities for which do not normally exist, are forgotten until its too late.

*Managerial Constraints*

It is seen that the technical coefficients are relatively well known. Unfortunately, they are known by only a few persons and this to my mind is the major constraint to the rapid expansion of corn production in Guyana and the region. There are just not enough trained people, at the professional and sub-professional levels, with the basic training to learn the techniques and pass them on to the farmer. More importantly, the majority of those few persons with the basic training have not been exposed to large scale cultivation (indeed, any cultivation) and therefore do not have the confidence to adjust or modify the known coefficients to fit any peculiar situation(s) that normally do arise during the cultivation of a crop. There is an acute shortage of managerial skills; in the case of Guyana, this shortage is felt more when it is realised that the potential areas - except those of the riverine regions - have no tradition of any form of agriculture. This is one reason why Guyana has switched to the farmer, to build on whatever skills he has and to supplement them so as to get a rapid take-off. Those personnel that are available have to address their attention to the following managerial problems.

The type of cropping patterns to be followed for the two systems must be determined. In the riverine areas, monopolised by farmers, is the practice of bush fallow to be allowed to continue; is a system of rotation with a legume possible, or is the present intercropping system better? In the Intermediate savannahs and the North West Region, the question of what rotation again has to be asked, but the rotation base can probably be broadened to include livestock. This would be important in assisting in soil conservation which is essential in both areas. Models for these mixes have to be devised to come up with the correct combination of enterprises. These combinations must define the relative averages and cropping periods. Hooker [11] has done a very preliminary study on the Intermediate savannahs, but much more needs to be done and this represents a ripe field for agro-economists.

The suitability of the existing machinery for land preparation and other tillage operations must be determined. Experience has shown on the Intermediate savannahs that lighter machines may be necessary to allow their use shortly after heavy showers of rain and thus enable a schedule to be maintained. The utilisation of land machines and aerial means for post-planting application of fertilizers and insecticides have to be examined and compared. For example, at what critical acreage does aerial spraying become more efficient in terms of both the cost of application and the ability to cover the planted acreage in time?

All of the above facts must be available to allow proper planning - planning that is much more efficient than what is presently possible because of the lack of the data previously outlined. In addition, the overall development of the production areas has to be considered. These areas do not have any developed physical and social infrastructure. These, therefore, have to be provided so that a "happy" work force can be maintained there.

In conclusion, although the management constraints may appear numerous, the fact that they have been recognised is important. As the technical constraints, they will be solved with time and practice during the exercise of maximising corn production. These constraints must not be allowed to dim the ardour towards achieving our goal. There is enough information to proceed at a quick, if not rapid, pace.

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