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Boilable cassava varieties: What is their role within the context of the global agricultural economy?

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Abstract

Cassava production and utilization in Cameroon have undergone a long evolution. The post-independence and pre-1990 eras were marked by activities that considered cassava to be a subsistence food crop. During this period, farmers relied on coffee and cocoa as the major cash crops. Cassava growers used mainly boil–and–eat varieties that could be sold in local markets.. The crop gradually became important as a cash crop when coffee and cocoa prices fell in the world market. In recent years, cassava has gained prominence in all parts of the country where the crop is now grown for cash. Varieties responding to this market demand have had to be developed and disseminated to growers. The issue of the types of varieties needed to give cassava its place in the world market needs to be revisited. Effective processing and high quality control of processed products have to be addressed adequately for cassava to insert itself in the global economy.

Key words: cassava, culinary properties, Agricultural economy

Introduction

Cassava is an important staple in Cameroon where it furnishes the most calories in the diet of more than half of the population. Cassava growers in Africa have received many improved varieties in the past, yet more than 60% of cassava fields are still planted with local varieties. Growers indicate that they keep these local varieties because they possess certain attributes that they hold in high esteem, such as "mealyness," dry matter content, short cooking times, and high productivity.

In Cameroon, after the Cameroon National Root Crops Improvement Program was created, several new varieties were developed and distributed to growers. Years later, surveys made to determine the levels of adoption showed that growers in several zones of the country had retained very few of these varieties. The reason given for the low adoption was the poor cooking quality of the newly released varieties. A new breeding program was thus started to provide varieties with improved cooking qualities for growers in those regions where the earlier varieties had been rejected. Surprisingly, it has been observed that the proportions planted to the formerly rejected varieties and to those recently developed for good 'cooking quality are about the same when hectarages are compared. This paper highlights issues relating to the evolution of the cassava industry in Cameroon within the context of the development of cassava varieties in the country.

Characteristics of pre-1990 cassava varieties in Cameroon. The Cameroon National Root Crops Improvement Program was organized in 1977 after a tri-partite agreement was signed between the Canadian International Development Research Centre the Belgian Agency for Cooperation in Development, and the Government of Cameroon, with the technical assistance of the International Institute of Tropical Agriculture, Ibadan, Nigeria.

In Cameroon, cassava is consumed boiled or processed. In the monomodal rainfall forest and the

moist savanna zones where cassava is an introduced crop, the roots are mainly processed into *gari,* flour, and traditional pastes (*miondo* and *mintoumba*). In the bimodal rainfall forest region (home of cassava utilization in the country), on the other hand, a portion of the harvest is consumed directly as boiled roots, and the rest are processed into a paste (*bobolo*) and other products. The local markets are fed with both fresh roots and traditionally processed products. Because of the diversity of uses in the various parts of the country, growers' preferences for appropriate varieties have also differed with time.

After 7 years of cassava research, high yielding varieties, resistant to the major diseases and pests, were released and distributed to growers. Among these varieties were 8034, 8061, 8017, 820516, 1005, 1187, 1198, 224, 465, and 8117 (Table 1).

The varieties 8034, 8061 and 8017 were widely accepted in the monomodal rainfall forest zone (in the Southwest and Littoral administrative provinces of the country). Later, national surveys were conducted and growers were interviewed to determine the reasons for the high rate of adoption of these varieties in that area. Results showed that in that area cassava was all processed into flour (*kum-kum* and *water-fufu*), *gari*, and *miondo*. In contrast, in the bimodal rainfall area of Cameroon, growers adopted only one (1005) of the 14 improved varieties released, (Ngeve and Fouda 1987). Here, it was later discovered that consumers wanted boil-and-eat types, and so growers were willing to grow only multi purpose types, that is, those varieties which could be boiled and also could be processed. In the bimodal rainfall forest area, the traditional way of using cassava is that when roots are harvested, some are boiled for direct consumption and the surplus processed into *bobolo*, traditional fermented paste.

Characteristics of post-1990 cassava era in Cameroon. Baseline diagnosis of cassava growers' constraints after 1990 showed that the major field and consumer problems were: (a) lack of high yielding boilable varieties; (b) lack of varieties carrying adequate field resistance to the *cassava mosaic virus*, cassava root rot, and anthracnose diseases; and (c) lack of control measures for the African root and tuber scale.

After 1990, it was then realized that the cocoa and coffee boom was over, and much emphasis was now placed by growers on crops, such as cassava. Growers could educate their children with relative ease with proceeds from the sale of a substitute crop (cassava). Yet many consumers in some parts of the country still needed varieties which they could boil and eat and also could process into local food forms. There was thus a need to develop such multi purpose varieties. A new cassava development Program initiated to address these constraints yielded the varieties, Excel and Champion, with fresh yields of about 38 t/ha (Table 2). Although these varieties were high yielding and had high starch content, their adoption was limited because of low dissemination as a result of a lack of planting material for an ever-growing farming population.

The Food and Agriculture Organization (FAO) in its Technical Cooperation Program, offered to assist the Government of the Republic of Cameroon in the rapid multiplication and distribution of high yielding varieties adapted to the various regions of the country. This 2-year Program established primary, secondary, and tertiary multiplication plots all over the cassava growing regions, trained growers on rapid multiplication techniques and opened Farmer Field Schools in six zones to disseminate production technologies. In this scheme, some 20 million cuttings of improved and adapted varieties were distributed to growers in various parts of Cameroon.

Characteristics of the current cassava industry in Cameroon. It was soon realized that growers were not obtaining earnings from the local cassava industry commensurate with the efforts they were putting into it. Better proceeds could be obtained only from processing, since processed products were seen to have a longer shelf life and could be marketed over a longer period of time. Hence, those varieties developed earlier, which had been rejected at that time because they did not meet the boil-and-eat needs of the consumer population in some regions, were now reconsidered for cultivation; the same growers now turned to accepting the varieties they had earlier rejected. Interviews conducted with farmers to determine the reasons for this change in attitude showed that many growers are no longer small-scale farmers but big, modern producers, most of them *retired* ministers, Directors-General of states and private corporations, and bank managers. These modern producers have several characteristics in common: (a) many have travelled extensively out of the country and have seen broader opportunities for cassava; (b) they have been to and made contacts with foreign and international markets; (c) they are ready to invest in a crop which they know has tremendous potential in international trade; (d) they have the

resources to afford the services of hired labor to expand cassava hectarages; (e) they can afford to fund processing units to pre-process roots on a large scale; (f) they can handle external marketing hurdles, and (g) they can afford to purchase or rent the needed land and equipment for large-scale farming. Such modern growers are now growing cassava mainly for cash. These characteristics have transformed cassava from subsistence to a cash crop.

Cassava has also become more popular because over the years, several processed products have entered the diets of many consumers in areas where their traditional staples have failed. This is the case with the *Bakweri* populations in the Southwest province of Cameroon who have replaced cocoyam *fufu* with cassava *fufu* because the prevalence of a fungal root rot has grossly reduced cocoyam production in the area. This means that those varieties which were initially high yielding and high in dry matter content are now considered acceptable for cultivation. Therefore, the earlier varieties, 8034, 8017, and 8061, are now grown to a large extent by growers even in areas where they had formerly been rejected. This has revolutionized cassava cultivation, as yields have continued to increase with the rapid adoption and use of these superior genotypes, considered appropriate as long as they are high yielding (in storage roots), and have high dry matter and high starch content.

The cassava revolution–the role of cassava in the global cassava economy. The agricultural system of today produces more food and food products to feed the ever-growing world population which stands now at 6 billion (Curtis 2001). Yet some 840 million people, most of them residing in developing countries, still remain underfed, making food insecurity and hunger a part of everyday life. If cassava is to participate effectively in the global economy, certain attributes will have to be met. Today's varieties must (a) produce high dry matter yields, (b) possess high starch content, and at the same time (c) resist major environmental and climatic hazards. The challenge today is to increase productivity, marketing opportunities, and profitability: introduce technologies in the sub sector that will drive down costs of production, harvesting, processing, and marketing; (ii) improve quantity, quality, and standards of products for diversified uses; (iii) make products competitive with other raw materials and enhance public and private sector partnerships. In each African country, cassava processing must also ensure high quality control standards to make locally processed products competitive with those produced externally.

For now, processed cassava food products from Cameroon are sold in regional markets in Gabon, Equatorial Guinea, Central African Republic, and Nigeria. Even in those parts of the country which produce enough cassava, weak distribution systems, isolated populations, and the long distances between producing areas and consumption centers cause a glut in local markets and food shortages in urban areas. Yet it is generally agreed that it is only with rising farm incomes that poverty can be reduced (Joekes and Weston 1994; Joekes et al 2000). Therefore, in order that the full potential of the cassava crop can be realized in Cameroon, industrial processing of roots into starch and flour has to be encouraged and improved. Also, the complex web of modern cassava producers, consumers, local, regional, and international markets, developed and developing countries, and domestic and international politics, must be properly understood to know how they are interacting to shape cassava agriculture in a global economy. If this complex network is understood and competitive production is ensured, rural incomes will increase. This will result in rural development which, in turn, will ease urban poverty by slowing down the migration of the youth from the countryside to the urban areas.

Cassava has many uses, most of them derived from starch and flour. It has often been said that "what starch can do, cassava starch does best." Its starch can be used (a) as fillers in tablets and other pharmaceutical products (b) as a syrup concentrate in soft drinks and canned foods; (c) as a binding agent in processed foods; (d) in bakery and confectionary (bread, biscuits, etc,); (e) as a thickener in soups and baby food, and (f) as a sweetener in the production of glucose, maltose, fructose, and monosodium glutamate (Knight 1969).

Some countries, such as Thailand and Brazil, have improved their economies through the sale of cassava products, most of which are exported to the European Union countries, the USA, China, and Japan, where the storage roots, packaged and shipped as dried chips and starch, are used in the manufacturing of cosmetic, pharmaceutical, and construction products. In these developed countries, high quality starch is used in the production of gum, and monosodium glutamate, in coating capsules, in the wet stages of paper manufacturing, and in soft drinks. Cassava is likely to play a similar role in Cameroon if the production, processing, and marketing are organized, and quality control is ensured and enhanced for competitiveness.

The quality of cassava processing needs to be

enhanced with regard to the quality control of starch and flour, the two major commodities from African cassava in high demand. To ensure that locally made high quality starch and flour are utilized by local processing industries and for them to be acceptable to meet the exigencies of the international export market, productivity enhancement along the value-chain, and high quality control procedures have to be adopted and processors guided to ensure a regular flow of these products to the common market and in local bakery, cosmetic, pharmaceutical, paper, plywood, and other industries. An increase in this domain will naturally lead to a reduction in the dependence on foreign starch and flour for home industries and the need to spend foreign exchange to purchase these commodities. For instance, in the bread industry, it has been shown that compounding 30% of cassava flour with 70% wheat flour can produce bread which is just as good as whole wheat bread (Kim and De Reuter 1968a,b). High quality flour may even allow an increase in the proportion of cassava flour in the mixture, and reduce dependence on wheat flour for a commodity (such as bread) which is widely consumed now in Africa.

Conclusions

Cassava is now a commercial crop with production oriented towards a market economy. Value-addition and productivity enhancement along the value-chain must be emphasized. Harvested roots must be processed into chips, flour, and starch to prolong shelf life and increase value. Although the small-scale farmers are still in the minds of researchers, in order that the growers can effectively assure their families' livelihoods, health, and food security, they need to increase production hectarages to achieve economy of scale, through the use of superior varieties, agricultural inputs to maintain fertility and control pests, mechanized land preparation, machine-assisted harvesting, and processing into competitive products which can be sold for a large profit margin in

Table 1. Characteristics of main cassava varieties released prior to 1990 in various zones in Cameroon.

Zone	Variety	Root yield† (t/ha)	CMD‡ severity s core (1−5)	Cooking quality characteristic
Monomodal rainfall forest zone (Southwest and Littoral provinces)	8034	34.0	1.2	Non-boil
	8061	34.5	1.5	Non-boil
	8017	32.8	1.4	Non-boil
Bimodal rainfall forest zone (Centre, South and East provinces)	1005	36.0	1.8	Boil
	1187	32.5	1.5	Non-boil
Moist savanna (Adamaoua province)	224	35.0	1.4	Boil

†Means of three years (Source: adapted from CNRCIP 1984); ‡cassava mosaic virus disease on a score of 1 to 5 where 1 = no symptoms and 5=severe damage.

Table 2. Characteristics of main cassava varieties released in the bimodal rainfall forest zone of Cameroon after 1990

Yield			Pest and disease severity		
Variety	Fresh yield (t/ha)	Dry matter content (%)	CMD*	CRR+	ARTS‡
Excel	37.5	32.5	1.0	1.3	1.0
Champion	38.0	31.0	2.0	1.5	1.0
92/80297	39.0	29.6	2.3	2.5	2.4
92/8520	37.5	30.2	2.5	2.8	2.5
94/01569	35.0	30.1	2.8	3.0	2.0
94/081	35.0	29.3	2.5	2.8	3.1

*CMD (cassava mosaic disease) on a score of 1 to 5 where 1 =no symptoms and 5 = severe damage.; +CRR (cassava root rot) on a score of 1 to 5 where 1 = no symptoms and 5= severe damage; ‡ARTS (African root and tuber scale) on a score of 1 to 5 where 1 = no damage and 5 = severe damage.

developing and developed countries and over a longer period of time. Only then can cassava in Cameroon take its place in the global economy.

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