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Evaluating the Constraints and Opportunities for Sustainable Rice Production in Cameroon

Piebiep Goufo

Faculty of Science, University of Yaoundé I, P.O. Box 812 Yaoundé, Cameroon College of Agriculture, South China Agricultural University, 510642 Guangzhou, P.R. China.

Abstract: In Cameroon, economic factors have driven more and more people into the agricultural sector. Today food production constitutes an important component in the livelihood strategies of many farmers. Given the increasing rice consumption trend in the country, rice self sufficiency is seen as a means to achieve food security. The per capita consumption in the country in 2006 was about 23 kg rice equivalents, compared to 2 kg in 1960. The country has highly favorable resources for increasing its production; however, it will not happen automatically. For Cameroonian rice farmers to be able to fully realize sustainable production a number of obstacles need to be tackled and supportive agricultural policies adopted. This paper underlines major constraints to increase rice production in Cameroon. Proposals are also made for the sustainable development of the sector.

Key words: Rice production, Cameroon, consumption, imports, constraints, opportunities, Challenges

INTRODUCTION

Until the 1990s, rice in Cameroon was considered as a western crop and a delicacy eaten only on feast days or special occasions like Christmas[1]. During the past three decades however, the crop has seen a steady increase in demand. Now, a larger section of population prefers to eat rice on a daily basis rather than cooking only on ceremonial occasions. Rice today is the staple food in many families and constitutes a major part of the diet in many others. Per capita consumption has increased from 2.3 kg in 1961 to 22.4 kg in 2005 (Table 1). Rice cultivation in Cameroon started in the early 1930[2]. By creating *the Société d'Expansion et de Modernisation de la Riziculture de Yagoua* (SEMRY) in 1954, the *Upper Noun Valley Development Authority* (UNVDA) in 1974 and the *Société de Développent de la Riziculture dans la Plaine de Mbo* (SODERIM) in 1978, the Cameroonian Government was motivated inter alia, by the desire to increase national rice production to meet the country's consumption level and raise the standard of living of the population. To some extent, by 1985, the Government succeeded in its mission. The worrying factor is, however, that the country has never been able to keep self-sufficiency in rice. World production trends indicate that Cameroon had one of the greatest increases in production between 1961 and 2005 with an expansion by over 1500%[3]. Although this figure can look significant, the record, however, is one of stability rather than growth. The Cameroonian population has grown faster than total production[4]. This is of course, in addition to a shift in consumer preference. Rice demand today exceeds production and large quantities of rice are imported to meet the country requirements, at huge expense in term of hard currency.

According to FAO[3], only 6% of the total world rice production is traded. World rice reserves, estimated at 80.6 million tones in 2005-2006, are at the lowest level since 1983-1984. These stocks represent less than 2 months of consumption and half of the stocks are being held by China. Rice prices are rising and are expected to double in the next couple of years. That has serious implications for Cameroon because 87% of the country's demand for rice is being met by imports. That low level of global reserves is too limited to rely on. Cameroon should urgently reconsider its domestic production to avoid the looming crisis. Ishii[5] puts it clearly: "rice can save Africa". Accordingly, the expansion of rice production is very timely indeed.

Much has been done since the independence to promote agricultural development. It is through such efforts that Cameroon has discovered rice as one of the crops that can be grown and contribute to the solution of the food problem. Cameroon has an immense untapped potential to produce more rice than it needs. Research has proved that rice can be grown and is in fact being grown in Cameroon's three ecological zones: the forest, the savannah and the arid regions[6,7,8]. Unfortunately, rice growing in Cameroon is plagued by many constraints requiring urgent attention.

Corresponding Author: Piebiep Goufo, Faculty of Science, University of Yaoundé I, P.O. Box 812 Yaoundé, Cameroon College of Agriculture, South China Agricultural University, 510642 Guangzhou, P.R. China. Email: piebieb@yahoo.fr

This paper analyses the general trend of rice consumption and import in Cameroon, exploring the reasons for the stagnation of production and its implications for the goal of food security in the country. It also suggests ways to improving the sector and highlights the opportunities and challenges for achieving rice self-sufficiency.

Rice Consumption and Demand in Cameroon: During this century, rice gradually became a staple food for consumers in Cameroon. The consumption of rice has increased much faster than that of other food crops and according to previsions at the national and the international level, this is likely to continue for some time[9,10]. From 1961 to 2005, Cameroon increased consumption by almost 8,000 tones per year reaching the level of 18-22 kg per capita of paddy rice equivalent to a daily intake of 120-150 calories. Total consumption of white rice rose from 12,210 tones in 1961 to about 142,490 tones in 1990 with an annual growth rate of 8.5%. During the 1960's Cameroon had one of the lowest annual growth rate of total consumption and per capita consumption of rice in the sub-region, 4% and 1% respectively. Per-capita consumption during the 1960's averaged 3 kg and reached 15 kg in 1995-1999. Since then, Cameroonian consumption levels have grown significantly at 5% per annum (Table 1).

A combination of various factors seems to have triggered the structural increase in rice consumption in Cameroon: rapid population growth and urbanization amongst other reasons are the most important[11,12,13]. The urbanization rate, which was 17% in 1960, rose to 41% in 1990 and now stands around 52%[4]. Associated with the rapid urbanization were changes in familial occupational structures. Meal preparation is very time consuming in Cameroon. The preparation of *fufu*, for example, can take 2 to 3 days. On the other hand, rice is easy to preserve, cook, handle and serve, thereby reducing the chore of food preparation. The shift in consumer preference from the other traditional food crops can also be explained by improved standards of living of many Cameroonian families 14 years after the devaluation of the CFA franc. The falling of rice prices by about 50% over the period of 1985-1990 further explained why rice has became a staple food in Cameroon (Table 2). The rice prices in 1988-1990 in Cameroon were relatively stables, recording only an annual increase of 4.5% compared to other products like bread (5.8%), cassava (11%), cocoyam (13%), yam (17.4%), and plantain (19.8%) (Table 3)[14,15,16]. With its not withstanding cost, consumers have been the main beneficiaries and rice is no longer a luxury food in Cameroon. It is estimated that for the Cameroonian poor, food purchases account for over 50% of total expenditures of which rice accounts for 75%. The survey conducted by the *Association Camerounaise de Défense des Intérêts des Consommateurs* (ACDIC)[10], indicates that three out of four homes consume rice three to four times a week and almost 3% of the population eat rice on a daily basis. Cameroonian rice consumers' preferences are indicated in figure 1.

Though rice contributes a significant proportion of the food requirements of the Cameroonian population, production capacity is far below the national annual consumption of about 400,000 tons. Internal production could only meet 13% of the country's need. In order to meet the increasing demand, Cameroon has had to resort to importation of milled rice to bridge the gap between domestic demand and supply.

Rice Import and Outside Aid in Cameroon: According to the *Food and Agriculture Organization of the United Nations* (FAO), food import surges in some developing countries for the period 1999 to 2003. Cameroon was one of the countries, which witnessed the most prevalent and frequent surges with rice identified as the most affected commodity[13]. In Cameroon, rice import was very insignificant in the 1960s with 3.46 thousand tons in 1963. However, there was a phenomenal rise in imports since 1970. Between 1961 and 2000, Cameroon had spent about $420 million on rice importation alone, an average annual import value of $11 million. In 2000, the total import bill of rice was $28.59 million. From 2000 to 2005, rice imports to Cameroon increased nearly 100% while domestic rice production remained fairly stable (Table 1). This is despite the increased tariffs and taxes ordered by the Government as responses to the surges and injuries. Table 4 gives the list of the major countries exporting rice to Cameroon in 2005 with China being the first. The situation has changed recently and Thailand actually occupies the first position[17]. Today, Cameroon is a net importer of rice with a yearly average of 400 thousand tonnes, and is amongst the chief importers in Sub-Saharan Africa. Although import data is presented, however statistics are far from reflecting the reality in the field and must be discussed with great reserve because they do not take into account parallel imports and international food aid.

The country has become increasingly dependant on outside aid[18]. The first FAO record for rice food aid in Cameroon indicates that about 2 thousand tons was received in 1978. Since then, food aid received from various countries and international organizations shows and increasing trend and has been increasing steadily from 2.5 thousand tons in 1980 to 9.2 thousand in 1990 (Table 1). The small decline between 1990 and 2000 could be attributed to the rumours of corruption and misuse of food aid by local authorities. Under the *United States Department of Agriculture Food for*

Table 1: Evolution of production, import, food aid, export and consumption of rice in Cameroon, 1961-2005.

Year	Production (000 t)	Imports (000 t)	Imports (million $US)	Food aid (000 t)	Exports (000 t)	Total consumption (000 t)	Per capita use (kg/year)
1961	4	8.21	1.09	-	-	12.21	2.3
1965	13	9.42	1.44	-	-	22.42	3.8
1970	14	7.79	1.40	-	-	21.79	3.3
1975	30	1.71	0.91	-	3.38	31.71	5.0
1980	46	20.72	6.44	2.5	6.12	74.43	8.6
1985	107	47.76	10.52	11.3	9.77	114.73	11.5
1990	55	90.29	26.59	9.2	0.31	142.40	12.4
1995	62	124.14	26.09	4.4	0.09	179.41	13.6
2000	61	158.21	28.59	4.9	NA	275.12	18.1
2005	53	301.10	85.23	11.2	NA	388.41	22.4

SOURCE: Estimated from MINAGRI[9], USDA[18], FAOSTAT[3], - = magnitude zero

Table 2: International prices ($US/t FOB) of selected types of rice, 1980-2000

Year	Thai rice, 2nd grade 100%	Thai rice, 5% broken	US rice, long grain no2 (4%)	Pakistan rice, Basmati (40-45%)
1980	241	395	391	600
1985	188	222	361	651
1990	278	315	332	564
1995	336	284	371	586
2000	207	241	271	NA

SOURCE: FAOSTAT[3]

Table 3: Applied tariffs (1000 FCFA/t) for rice in Cameroon, 1961-2005

Year	Government support/procurement (rough or milled rice)	Farm harvest (rough rice)	Whole sale (milled rice)	Retail price (milled rice)
1961	14	8	65	72
1965	14	8	65	72
1970	16	12.5	65	79
1975	30	20	115	147
1980	45	37.5	134	149
1985	78	70	171	190
1990	80	75	151	195
1995	NA	NA	NA	365
2000	NA	NA	NA	325
2005	NA	NA	NA	450

SOURCE: ACDIC[10], FAOSTAT[3]

Progress Program (USDAFPP), the country received 21,000 metric tons of rice in 2003, 10,000 in 2004 and 11,000 in 2005, It is pertinent to point out that since the launching of that initiative by the United States, Cameroon has been the largest recipient[10,18].

The major factors triggering the surge of rice imports in Cameroon stem back to the trade reforms implemented by the Government in the framework of its *Structural Adjustment Polices* (SAP) after the devaluation of the CFA franc in 1994. It is pointed

Table 4: Major exporters of rice towards Cameroon, 2004

Country	Quantity (000 t)	Value (million $US)
China	128.97	27.44
Pakistan	23.84	5.07
Thailand	23.61	5.02
India	16.57	3.53
Vietnam	7.60	1.62
Burma	4.08	0.87
France	2.79	0.59
USA	1.84	0.39
Singapore	1.79	0.38
Taiwan	1.35	0.29

SOURCE: Calculated from ACDIC[10]

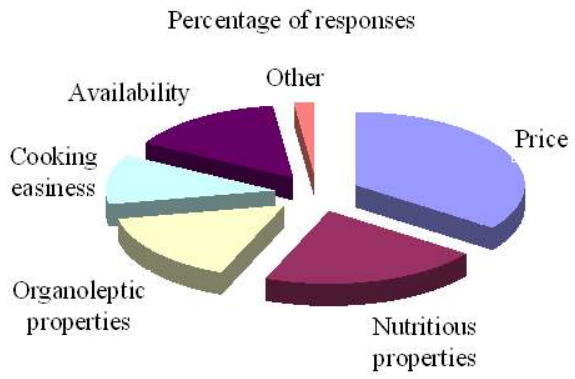

Fig. 1: Cameroon rice consumers' preferences[10]

out[12] that the major impact of the reforms which have significantly simplified the fiscal system was a reduction of the average taxation rates from 41 to 88% in 1994 to 3 to 51% since June 2000 (25 to 40%). Since then, the rise in imports has been sustained and was exacerbated by structural factors including limited production, consumer preferences, appreciation of the CFA franc, urban population growth, the lagging competitiveness of the domestic sectors[13].

Constraints For Rice Production Development in Cameroon: Cameroon's inability to produce rice to self-sufficiency is indicative of the presence of major constraints in the rice industry requiring urgent attention. The most important constraints to rice production in Cameroon are discussed below.

Misplaced Priority and Inconsistent Policies: After the independence in 1960, the irrigated technology was adopted as a central element in increasing Cameroon rice productivity and production[19,20]. Enormous capital investment was required to develop irrigated infrastructures for almost half a century despite the fact that the result was insignificant. Other ecosystems like upland and rainfed lowland were considered as a waste land. Ngwa[8] estimates at 3.4 billion CFA francs the sum allocated to UNVDA from 1977 to 1995. Between 1954 and 1990, SEMRY invested 40-50 billion CFA francs into the Logone project[14,15]. Some authors have also suggested that the creation of SEMRY in the northern region of Cameroon was aimed more at the Nigerian market than Cameroon and could explain the low competitiveness of local production[15]. Rice continues to be the most protected commodity in many countries except Cameroon. It has been pointed to the fact that in the major rice consuming countries, rice is a staple perceived as a political crop[21]. Therefore, Governments are sensitive about price effects and intervene to protect producers and consumers each time there is large price fluctuations. In Cameroon however, for many years Government policy in the rice sector was limited to attempts to control prices and to the promotion of large-scale import-substitution projects. The logical outcome is that both of these policies run counter to the interests of traditional food farmers and therefore have negative implications for the economic welfare of the great majority of the rural population[11,12].

Weak Institutional Setting: As a response to the decreased production of rice and surges of importation in the country, the Cameroonian Government took various measures like increased tariffs and taxes, partial ban on imports, reference prices and import quotas[7,13]. Despite these attempts however, the Government's institutional capacity to develop and

strengthen trade surveillance systems is insufficient for the effective implementation of trade remedy options. The institutions involved in trade monitoring are the ministries of livestock, agriculture and environment, the customs, the police and the Port Authority. Unfortunately, the institutions are not properly organized and with self-interest among some in authority often cited as the reason for the lack of controls. Official corruption, ethnic favouritism, and administrative incompetence are rife in the sector. Other potential factors include discriminatory and non rigorous issuing of import authorisation and misuse of import licences[13].

Poor Marketing Systems: Rice producers surveyed during a study conducted by FAO[13] attributed the current problems facing rice production and marketing in the country to a total lack of Government policy in the sector. The price and trade policies pursued are frequently being changed even within the year. That instability in policy environment tends to create an unstable investment environment for producers and other stakeholders hoping to explore the opportunities in the rice sector. Some respondents also reported long distance of swamps from villages and poor road network as a major constraint for the production and distribution of their harvest. Research in other contexts also revealed that disorganisation of market chain poses a fundamental constrain to rice productivity expansion[22].

Deteriorating Irrigation Structures: The result of a comparative analysis conducted in 1989[11] on the rice situation in Senegal, Cameroon, Madagascar and Côte d'Ivoire showed that Cameroon had the more mechanised and modern infrastructures for rice production in the 1980s. The disengagement of the Government from most agricultural activities in 1994 however, led to a poor management and utilization of water resources and deterioration of these facilities by farmers. Here, it is more or less the tradition for the Bororos herdsmen to migrate to the rice swamps for 4 months in a year, between November and March in search of pasture. The story is better told by the remnants of broken dams and canals, ramshackle drainage and irrigation patterns[8,19,20].

Land Tenure Insecurity: In 2005, out of about 9 million hectares of land cultivated to various crops in Cameroon, only about 0.2% was cultivated to rice[3]. Most of the rice produced in Cameroon is in the hands of small-scale farmers with farm holdings of less than two ha[10]. It was reported that high demand for labour by rice activities as compared with other staple crops tend to discourage farmers from expanding their rice holdings in many developing countries[22]. This is certainly not the case in Cameroon where rural population sees rice production as a mean of employment. Unfortunately, many of them do not have access to farms. In the North-West Province for instance, lands are under the control of the *Fons* or traditional chiefs and of UNVDA. UNVDA plots are rented out to farmers upon a registration fee ranging from 500 FCA to 2500 FCFA or above, depending on the number of plots for a specified period. Occupancy of plots owned by traditional chiefs is more complicated. Registration fees vary and are sometimes very high depending on the greediness of the Chief. Once registered, farmers are levied a development fee of 1000 FCFA to 2000 FCFA and are expected to give a bucket of rice to the royalty or the *Fon* after each harvest[23]. Many farmers' chances are affected by their inability to afford the registration fee. The same pattern was recorded in the Far-North Province where occupancy of plots is restricted by the *Lamido* or SEMRY[19]. The number of farmers involved is rice cultivation in the region has decreased from 17,900 in 1985[15] to about 10,000 in 2000[20].

Inconsistent Agricultural Input: The limited access of farmers to initial agricultural inputs acts as a barrier and hampers their ability to improve and expand their rice productivity, and generate higher incomes. Sixty-five percent of farmers interviewed in Cameroon have never used chemical products[10,24]. Fertilizers, herbicides and pesticides are found only in urban locations which farmers have to visit to make purchases. The country does not have the capacity to manufacture its requirement of chemical inputs and imported products, once cheap, are now sold at high prices to growers[25]. The failure to use pesticides and herbicides has provided suitable breeding places for mosquitoes and resulted in increasing human malaria incidence in many irrigated rice-fields around the country[26,27]. A positive correlation between residence in proximity of rice fields and the prevalence of urinary schistosomiasis has also been observed[28,29].

Inappropriate Technologies for Production: One of the critical factors that affect rice production in Cameroon is the traditional methods used in agriculture. Small farmers are unable to afford technologies such as tractors, power tillers and animal traction. Eighty-six percent of the agricultural population in Cameroon use handheld hoes, axes and cutlasses[10,24]. These methods are labour intensive, and make the work very time and energy consuming. Even animal tractions which according to the *United Nations Development Programme* (UNDP) calculations can help cultivate five more hectares of land compared to hoes,

are available only for a small portion of farmers[6]. At the post-harvest level, rice processing is constrained by inadequate and inappropriate equipments such as threshing, parboiling, drying facilities, winnowing, milling, and de-stoning, especially at the farm and village level. The inability to provide and use improved technologies in rice processing has led to the production of poor rice quality. Hand-threshing for example is responsible for the high percentage of stones and foreign matter mixed with the rice[22].

Lack of Sufficient Quantities of Improved Seed Rice: Absence of suitable varieties has been identified as one of the major constraints to further development of the domestic rice sector in Cameroon[30]. A large proportion of rice farmers still depend on the traditional varieties, which are of low yield and not adapted to the various altitudes. A study of the rice sector revealed that of the total of rough rice received by SEMRY every year, only 24% and 40% of total and broken rice respectively, are produced which is very far below the world average[15].

Little Access to Credits: Farmers cannot buy agrochemicals, tractors and other modern technology because of lack of funds and credits. Most of them do not have access to credit: interest rates and collateral requirements are simply too high for the majority of them[24,31].

Week Research Support and Inadequate Training of Farmers: In 1965, the Government of Cameroon established the *Office National de la Recherche Scientifique et Technique* (ONAREST) in order to promote agricultural research, training and extension. In 1979, the *Institute of Agronomic Research* (IRA) was created within ONAREST with a strong emphasis on rice. The creation of IRA Maroua in the North Province was a step in that direction. The program also supports research at Njombe (West Province) and Ekona (North-West Province). The result has not been a success story[32]. Some of the goals have been accomplished, some only partially and yet, a good deal abandoned. In most cases, very expensive technical choices were made without sufficiently taking into account the real needs of local populations. Consequently, results have never moved from the experimental phase to the phase of production by local farmers. That situation has resulted in weak link between research and development, week performance of extension services. Despite they are the key components of rice production systems, rural farmers are not usually aware of improved agricultural activities that are supposed to increase their productivity[33,34].

Gender Disparities and Inequality: The problems associated with gender bias in Africa are well known but, nonetheless worth reviewing.Women participate in most of the operations in rice production, processing and marketing in Cameroon. In the Ndop region for instance, they supply about 70% of the labour needed for rice cultivation[23]. However technological adaptations and practices fail to pay sufficient attention to their needs. The role of women is either minimized or not well understood by agricultural authorities in the country. Past efforts to generate or transfer new rice technologies have most often by-passed women farmers, situation which obstructs efficiency and performance[8,34].

Environmental Constraints: Because of the little importance Cameroonian researchers attached to rice, there is very few information about environmental constraints to rice production in the country. Low temperatures during the off-season in irrigated areas have been identified as the main physical constraint[24]. Poor drainage and water management practices and deficiency of manganese have also been mentioned in the North and Far-North Provinces[35].

Opportunities for Rice Production Expansion in Cameroon: Projections are that by 2025, the Cameroonian population will reach an estimated 24 million people, an increase of about 30% from its 2005 level[4]. That population growth would be translated in an expanded rice demand of 35%. This means that Cameroon would have to produce or import an added 130 thousand tons per year above the current level. It would be recalled that national food production by a country is an important component of the strategy for feeding the population, the other two basic components being food distribution and population growth[12,21,36]. With regard to this Cameroon would have to wake up and reverse the disastrous trends in his rice production system. Enormous possibilities exist for increasing rice production in Cameroon with adequate support from the research sector and the Government.

Favourable Rice Growing Ecologies: Cameroon is blessed with favourable rice growing ecologies. First, the country's water resources are enormous: Cameroon receives on average, 842 km of rainfall per annum. The hydroelectric potential of Cameroon comes second in Africa after the one of the Democratic Republic of Congo and per capita water availability in the country is one of the highest among African countries. The western highlands of Cameroon, for example, have a relatively long rainy season and swampy soil both of which favour rice cultivation. Many rivers in the West, South, Centre and Far-North Provinces have well-

developed floodplains in their middles and lower stretches suitable for rice production. But only 4% of this potential is being utilized today[37]. Rather than attempting to adapt Asian and Lain American rice varieties to the Cameroonian environment by developing costly irrigation systems, the country should take a different approach and invest in lowland and upland rice technologies. Results indicate that lowland rice can still be grown in Cameroon without compromising other floodplain uses such as the irrigated agriculture and reservoir fisheries[38,39]. For example, it has been noted that Poli and Kaele in the Far-North Province with an average rainfall of 1200 mm and 850 mm respectively, offer excellent ecosystems for rainfed lowland rice[30]. Farmers in Pohri, Guidiguis and Taibong Subdivisions have recently tested the growing of upland rice on plots formerly meant for muskuwaari. This diversification phenomenon of agricultural production, although it is in an embryonic state, deserves a particular attention because it falls within an endogenous initiative[40].

Cameroon still has vast areas that can be brought into production and incorporated in rice production. The arable land account for 13% of the total land area and about 80% of it is uncultivated (Figure 2). One distinctive feature of Cameroonian's soils is their relatively high fertility and high moisture availability. To bring those lands into competitive production schemes however, the Government will have to invest in infrastructure. There is a definite relation between immobility and poverty. Countries with low standards of living are characteristically countries with poor transport facilities[36]. It follows that transportation (roads, port capacity, vehicles) can be the key factor in the success or failure of the entire development effort. More emphasis should also be given to initiate land reforms that take into consideration the status of rural farmers**.** Traditional authorities would also be wise to eliminate traditional norms that reduce the access to land in most communities.

Stable Irrigated Facilities: Another important gain for rice production will be the rehabilitation of abandoned irrigated schemes which provide the best conditions for rice cultivation as they offer better water control. While the area occupied by rainfed and upland rice is the largest in most African countries, the irrigated ecosystem account for the main part of rice production (88%) in Cameroon. One can easily agree that irrigation is a tradition in Cameroon[6,20,28]. This potential however, is yet to be fully developed. It is estimated at 33,000 ha the area already built and that can be restored for rice production all over the country[9]. The UNVDA for instance at it creation was set to produce 34,000 tones of rough rice per year. Only a mere 10 to 20% of it is currently exploited[41]. Under the supervision of *World Wildlife Fund* (WWF), a project was launched in 1994 for the rehabilitation of 17,000 ha located along the Lagdo dam[38]. It is important that the Government seize the opportunity and encourage such initiatives.

Research Thrust: As intellectual property rights are implemented, more Cameroonian students and researchers are getting involved in rice research. Research and development of rice in Cameroon is undertaken by the *Institute of Agricultural Research for Development* (IRAD). It is also a repository of seed breeding and production, and support technology transfer while ensuring a strong linkage among the various stakeholders, farmers, extension workers, and private sector[32,34]. New scientific knowledge is allowing rice researchers to develop better rice disease management methods. Testing of natural and biological products is being done in Yaoundé and Maroua in the context of an integrated pest management program in rice fields[42,43,44]. Other areas that should be addresses are intensification of the rainfed ecosystem, increased use of organic manure to reduce overdependence on inorganic fertilizers, breeding of suitable varieties able to withstand fluctuations in diurnal temperature. Cameroonian researchers will also benefit greatly from the collaboration with the *International Rice Research Institute* (IRRI) and the *African Rice Centre* (WARDA) as well as from the collaboration with other regional and international institutions involved in rice research.

The Advent of NERICA (New Rice for Africa) Varieties: Improved crop management practices and new varieties are a must to increase productivity. *New Rice for Africa* (NERICA), an interspecific hybrid between the local African rice (*Oryza glaberrima*) and the exotic Asian rice (*Oryza sativa*) offer new opportunities for rice farmers in Cameroon[45]. NERICAs have unique characteristics such as higher yields of 1.5-2.5 t.ha-1 without fertilizer application, and up to 4 t.ha-1 with good management, compared with unimproved upland varieties that yield less than 1 t.ha-1[34,46]. Other NERICA qualities include early maturity, some 30–50 days earlier, tolerance to major stresses, resistance to most pests and diseases, higher protein content (10-12%) and good taste compared with the traditional rice varieties[46,47]. A wide range upland and rainfed NERICAs varieties are available (Table 5). Farmers in nearly a dozen countries in West and Central Africa are now achieving bountiful rice harvests using NERICA varieties. Due to NERICA's huge potential, Cameroon can also boot its rice production. As previously mentioned, rice is mainly grown under irrigation in Cameroon. Fostering rice

Table 5: Characteristics of some NERICA varieties released by WARDA and under evaluation in different regions of Africa

Variety name	Ecology	Maturity (days)	Potential yield (t/ha)
NERICA 2, NERICA 8 NERICA 1, NERICA 3, NERICA 4,	Upland	75-95	4-5
NERICA 6, NERICA 7 NERICA L8, NERICA L12, NERICA L19,	Upland	95-100	4.5-5
NERICA L41, NERICA L42, NERICA L60	Lowland	NA	6-7
Sahel 108, Sahel 201, Sahel 202	Irrigated	95-120	5-7

SOURCE: WARDA[34]

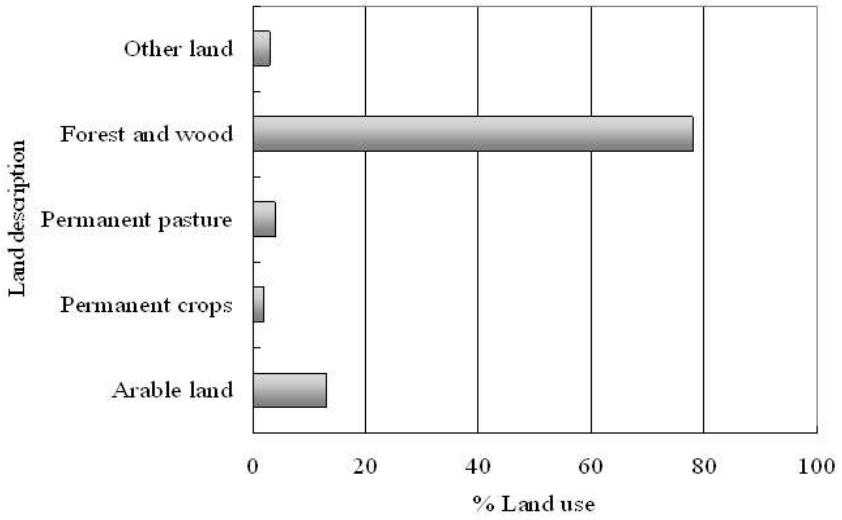

Fig. 2: Percentage land use in Cameroon[3].

production on other stable areas where the new varieties can express their yield potential will be the key factor in achieving a competitive production[22,24,35]. In Cameroon, the *Programme National de Vulgarisation et de Recherche Agricole* (PNVRA) has a national mandate to develop and supply improved varieties. Strengthening effective participation between PNVRA and WARDA will play a key role for the production and dissemination of NERICAs varieties to farmers.

Effective Presence of NGOs and Farmer Organizations: There is a need to understand that active extension services are key requirements for the dissemination of developed technologies to rice farmers. Findings show that 85%, 26%, and 23% of farmers in the Western Highland, the Forest Zone and the North of Cameroon respectively, are members of a farmer association or cooperative. It should also be noted that in these areas, rice production is likely to benefit from an important rural labor and at a reasonable cost**.** Sixty percent of the Cameroonian population is ready to get involve in agricultural activities and 95% of them willing to take a loan to do it if an opportunity is offered[10]. Farmers therefore need support and encouragement. With rural farmers the primary agents in food production, training them, exposing them to new technologies, and offering incentives could be an important step in reducing manpower requirement and improving the production of rice in the country[25]. Also, the private sector and *Non-Governmental Organizations* (NGOs) are becoming more involved in the agricultural economy of the country by the creation of farms, fertilizers and pesticides distribution schemes and micro-finance companies. Of the 73 NGOs distributed throughout the ten provinces of Cameroon, 20 focus efforts on sustainable agriculture[31,33]. This implies that the public sector should support these efforts rather than competing with them as it was the case during the past century.

Debt Relief under HIPC (Heavily Indebted Poor Countries) initiative: Debt relief at completion point under the enhanced HIPC initiative in 2006 is an important milestone for Cameroon towards rice production and poverty reduction. Within the framework of HIPC, Cameroon significantly lowers its

debt burden and effectively frees up resources to redeploy toward growth and poverty reduction[4,33]. Food security was highlighted as a priority, making the country eligible for the program. In that context, the Government must allocate more resources to the rice sector and initiate policies which play a positive role in sustainable rice production with the aim to achieve the following objectives: easy access to agrochemicals and farm machinery, improved market infrastructures, better crop management practices through training and capacity-building, easy access to land, labor and credits. It was estimated that to increase rice production in Cameroon by 30,000 tons yearly, we will have to invest 1.8 billion CFA Francs (4.25 million $US)[10]. Meeting these challenges however, will require fighting poor work ethics and corruption, and strengthening accountability.

Political Stability: Another source of comparative advantage will emerge from the political stability in the country. Recent deterioration of the security situation in some African countries because of military coups has resulted in changes in policy direction, creating lags in the implementation of rice development programmes[22]. Cameroon has benefited from a sustainable peace since its independence. International confidence in the prospects for and management of Cameroon's economy is likely to grow. Many countries are interested in investing in the rice sector. China and Egypt have recently announced their intention to build a rice development center in the country as part of their effort to help the country promote agricultural production[48]. The country should take advantage of that situation.

Conclusion: Cameroon is endowed with ecological conditions favorable for the cultivation of rice. It can produce sufficient quantities to meet local demand; however, production in the country fell short of consumption while the import bill remained high. The availability of cheap rice has until now provided a ready excuse for the Cameroonian Government to neglect the domestic rice production; and few efforts made to increase production and productivity were greatly hindered by the lack of a clear understanding of the specific needs of the farmers, and conditions under which they operate. This paper reveals that rice production in Cameroon is economically viable but needs supportive agricultural policies. It is a combination of various factors including the Government's decision to support its rice farmers by providing fertilizer and pesticides subsidy, price support, a ready market, in addition to facilities such as irrigation, roads, and machinery that will help the country boost its production. In a more open world, Cameroonian rice research will also benefit greatly from the collaboration between regional and international rice centers like WARDA and IRRI as well as from the collaboration with international agricultural associations. The survey of regional programs included here clearly shows that new scientific knowledge is allowing rice researchers to develop rice varieties that could give better yield and fetch higher prices. In this line, information on appropriate rice varieties and production techniques should also be presented to both men and women in rural villages and urban areas. These conditions, combined with effective promotion, should lead to a gradual expansion of rice production and use. We believe greater domestic production could save Cameroon scarce foreign exchange which will in turn contribute to food security and poverty reduction.

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