

**Coalition for African Rice Development**  
**(CARD)**

**May 29, 2008**

**JICA/AGRA**

*Africa's development has been significantly hampered by the underperformance of the agriculture sector. And yet, as the recent World Bank report noted, the agriculture sector has received inadequate attention by both governments and the donor community. Agriculture and rural development need to be turned from a drag on Africa's development into a potential driver of growth. There is a timely, new initiative launched for a 'green revolution in Africa' in a new partnership. Africa-Asia cooperation can provide a potent vehicle for such a partnership. TICAD IV should be a platform to launch a comprehensive plan to reenergize concerted international and regional efforts to help Africa promote its agriculture and rural development.*

*The following is an initiative with an overall strategy and a framework for action, jointly proposed by the Alliance for a Green Revolution in Africa (AGRA) and the Japan International Cooperation Agency (JICA). The initiative aims to respond to the increasing importance of rice production in Africa and to provide the international framework to assist self-effort of African countries to increase rice production, building on the existing structures, policies and programs, such as the Africa Rice Center (WARDA); the Comprehensive Africa Agriculture Development Program (CAADP) and the Africa Rice Initiative (ARI).*

## **Part A: Overall Strategy**

### **1 The background – supply and demand and production potential of grains in Africa**

1.1 The livelihoods of most African families depend heavily on agriculture, as approximately 70% of the people live in rural areas and 90% of these works in the agriculture sector. Agriculture contributes around 25% of Africa's GDP and the majority of its exports are agricultural products. Improvements in productivity and competitiveness in agriculture remain a challenge for food security and cash income as well as for export.

In addition, promotion of development of rural areas, where 65 to 90% of the African poor live, is essential for poverty reduction - a critical priority – and other goals under the Millennium Development Goals (MDGs).

1.2 The factors that constrain the productivity of farming in Sub-Saharan Africa are many: poor soils, lack of improved crop varieties, highly variable rainfall, and frequent droughts, among others. African farming is characterized by a pattern of 'low-input, low-output' and 'small-scale, multi-crop' production, mostly by smallholders. While this ensures the minimization of risks necessary for maintaining basic subsistence, it perpetuates low productivity and is susceptible to considerable yield fluctuations from year to year depending upon variable precipitations. Although the output of staple food crops has been on the increase in general, it has not been able to meet soaring demand for foods because of growing populations (at around 2.5%). Hence, the imports of grains from other regions have been expanding year after year (at a rate of 3% to 4%). Ensuring food security through increased, stable production of the staple food crops and improving, to that end, land productivity are therefore a matter of high priority for Africa.

1.3 Both production and consumption of main staple crops have been on the rise within the African region. The demand and supply of maize, millet and sorghum are in balance in general and the output of cassava often exceeds demand in some areas. On the other hand, the consumption of rice and wheat has been rapidly expanding in recent years and their increased output is unable to keep abreast of the growth in consumption. Accordingly, imports from Asia and North America have been escalating steadily. The present self-sufficiency ratios are approximately 60% and 30% in rice and wheat respectively. The widening demand-supply gap is being met by imports which in the case of rice amount to about 7 million tons<sup>1</sup> per year, requiring a substantial spending of foreign reserves (Figure 1).

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<sup>1</sup> In milled rice: Hereafter, figures will be indicated in paddy rice.

## **2. Outline of rice production in Africa**

2.1 Rice production in Africa has increased from 3.14 million tons to 14.60 million tons in the past 50 years. During this period, the area of cultivated land has expanded by 3.3 times, from 2.5 million hectares to 8.2 million hectares, whereas the yield per unit area has achieved an increase of only 30%, from 1.24 t/ha to 1.78 t/ha.

On the other hand, during the same period in Asia, rice production has increased from 200 million tons to 570 million tons, yet the area under cultivation has shown only a minor increase, from 107 million hectares to 137 million hectares, whereas the yield per unit area has increased 2.2 times, from 1.86 t/ha to 4.18 t/ha.

The above facts indicate that in Asia increased rice production has been achieved through an increase in the yield per unit of land, whereas in Africa the expansion in cultivated land is the primary factor in the increase in the total output (Figure 2).

2.2 Rice production in Africa has been highly concentrated, with only a few countries producing more than 0.5 m tons. The top fifteen countries in rice production are, in a descending order: Nigeria, Madagascar, Guinea, Mali, Tanzania, Côte d'Ivoire, Sierra Leone, Democratic Republic of the Congo, Ghana, Senegal, Mozambique, Uganda, Chad, Burkina Faso and Liberia. The total production of these countries accounts for 94% of the African total output (Figure 3).

## **3. Importance of rice promotion in Africa**

3.1 As discussed above, it can be said that among staple food crops, rice represents Africa's best opportunity for reduction of imports. It is believed that the price of rice and other grains in the international markets will stay at high levels in the foreseeable future through a combination of factors such as increased demands and changing consumption patterns in countries with growing economies, competition from production of bio-fuels from grains, and possible effects of climate change. Hence, innovative plans are called for that will contribute to improving self-sufficiency in staple food grains, including rice, as an important challenge for African countries. Any increases in local production will replace rice imports purchased with foreign exchange.

3.2 As indicated by a case in Uganda in which the cultivation of NERICA has resulted in higher incomes of poor farmers (Kijima et al., 2008), it can be expected that rice will contribute to higher incomes of farmers. Rice is a cash crop but different from other cash crops such as tobacco and coffee in that it can be consumed at home. Thus, it is an important crop from the standpoint of food security at the level of farmers as well.

#### **4. Goals of the Initiative**

**4.1 In light of the importance of increased rice production in Africa, this joint initiative for developing the African rice sector sets the following goals to be reached by the African states and farm communities and by the international community working in partnership, as part of efforts to promote a Green Revolution in Africa. Its main components are as follows:**

**(A) The main target will be to ‘double Africa’s rice harvest within ten years’, from the present production of 14 million tons to 28 million tons by around 2017<sup>2</sup>**

**(A model described in Table 1 in the Annex I).**

**(B) This goal will be achieved through a combination of measures, including:**

- 1. Yield-enhancing technical packages such as seed of improved varieties, fertilizers crop management practices tailored to country-specific agro-ecosystems;**
- 2. Large numbers of on-farm demonstration plots aimed at informing farmers of new production technologies;**
- 3. Small and medium-scale water management interventions;**
- 4. Introduction of small-scale rice processing equipment;**
- 5. Creation of better links between smallholder farmers and rice markets;**
- 6. Linkages with existing rice programs and policy frameworks such as the “NERICA Initiative” launched at TICAD III (2003), CAADP, and the African Rice Initiative (ARI);**
- 7. High level advocacy measures aimed at ensuring that the rice sector is adequately represented in CAADP national and regional roundtable processes;**
- 8. Partnering with all the stakeholders dedicated or capable of contributing to a Green Revolution in Africa;**
- 9. Preferentially targeting women rice producers to reduce their burden.**

**(C) The initiative will be accompanied by appropriate support measures that will contribute to the promotion of rural development and empowerment of farmers, such**

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<sup>2</sup> The initiative should not exclude the possibility of improving the productivity of crops other than rice, as appropriate.

as the introduction of renewable energies (solar energy, micro hydropower etc.) in off-grid farm communities.

4.2 In order to achieve the target of doubling Africa' s rice harvest, it is important to allow farmers who have not previously been able to grow rice the opportunity to begin doing so. The twin levers of change, research and extension, play important roles in facilitating new participation of farmers and their development. As a substitute for the conventional extension system, there is much to be expected from the use of the “farmer-to-farmer” approach.

4.3 It is also essential to develop a system and an environment that minimizes post-harvest losses and in which the rice grown by farmers can be sold in domestic and regional markets efficiently, thereby raising an incentive for farmers to participate in rice cultivation. At present, some countries within the African region have the potential for achieving self-sufficiency in rice production, but the opportunity is lost because of impeding factors such as low quality of rice, high production cost, poor access to funds, poor access to markets, etc. Consequently, to raise the self-sufficiency ratio in rice production, it will be required to take a comprehensive approach that enables the improvement of farm management, improvements in post-harvest handling, farmer collective action and entrepreneurship development, better access to market information and marketing (including branding and promotion), and improved infrastructure and access to funding. The participation of private enterprises should also play a key role.

## **5. Main issues and possible responses**

### **5.1 Agricultural policy**

#### **(Issues)**

- Absence of appropriate policy or weaknesses in policy research and planning for rice production increase (development of markets, development of new farmlands and securing agricultural water, etc.)

#### **(Responses)**

- Facilitation and advice should be sought to assist in stakeholder dialogues as a part of the formulation and implementation of policies to boost rice production.

## **5.2 Capacity building in research**

### **(Issues)**

- **Antiquated, poorly equipped, underfunded research institutes.**
- **Rice is a crop that has become a subject of research relatively recently in Africa. For the purpose of increasing the yield per unit area and stabilizing the output of rice, what is required is to develop a cultivation method suited for each agro-ecology and variety, etc., and researchers and technicians for such a task are lacking.**
- **Human and institutional capacity weaknesses including inadequate recruitment and succession planning in research institutions and across the board in value chain actors, including the private sector.**

### **(Responses)**

- **Improve capacity for research of rice units within national and international institutes; provide training for researchers, technicians and research managers based on comprehensive institutional analyses to produce fully functional rice units. Stronger research teams will be linked to groups in need of assistance to encourage practical learning. Rice research training groups will be strengthened.**
- **Improve the quality of BSc, MSc and PhD training in agronomy and breeding through a range of training opportunities. Provide practical training in rice agronomy, breeding methods, and water management at research institutes including International Rice Research Institute (IRRI), and the Africa Rice Center (WARDA) in collaboration with universities and other institutes around the world.**
- **Study the possibility of establishing a system in which research results are properly evaluated and reflected in the treatment of researchers in order to improve their practical research capacity**
- **Provide technical guidance concerning rice cultivation methods to researchers at agricultural experiment stations in each country.**

## **5.3 Improvement of breeding and seed production**

### **(Issues)**

- **As for upland varieties, NERICA has been steadily spreading in Africa thanks to the efforts by WARDA. In the future, it will be necessary to increase the multiplication of registered seed at national agricultural research institutes in each country and the production of certified seed by contract farmers. However, there are some countries that**

lack the capacity to perform these tasks. In some countries, it takes a number of years to register new varieties, which imposes a constraint upon the quick diffusion of good varieties.

- High-yielding, drought-tolerant, and pest- and disease-resistant lowland rice varieties need to be developed. Research institutes including WARDA, IRRI and the Japan International Research Center for Agricultural Sciences (JIRCAS) have been engaged in the development of appropriate varieties.

#### **(Responses)**

- Strengthen capacity for production and multiplication of foundation seed and certified seed of NERICA and other improved, adapted varieties in each country and strengthen the distribution system
- Where appropriate, encourage national breeding institutes to collaborate with the local private seed sector in the production of both foundation and certified seed
- Expedite the procedure of variety registration in each country
- Promote the development of superior varieties for rainfed lowland and irrigated environments
- Support seed legislation harmonization across countries and sub-regions to facilitate the movement of seeds of improved varieties

### **5.4 Agricultural land development and water supply**

#### **(Issues)**

- The area planted to rice in Africa can be classified by agro-ecology into rainfed upland, irrigated, and rainfed lowland by ratios of approximately 38%, 20% and 42% respectively.
- In the rainfed upland environment, it is shown that soil fertility has often been depleted due to a shortened period of fallow.
- In large-scale irrigation schemes, it is necessary to fully scrutinize the feasibility of developing and managing new schemes, because it involves problems such as considerable investment costs, maintenance of irrigation facilities and difficulties in the management of water-users associations. It is also essential to look into the possibility of rehabilitating old facilities.
- As for the lowland environment, it has been reported that there is an area of about 240 million hectares in Africa in total (J. C. Norman and E. Otoo, 2002) and that rice can be grown in approximately 10% of the area, that is, about 20 million hectares (Wakatsuki,

2007). Nonetheless, a development model for rice cultivation in lowlands has not been fully established (in terms of improved adapted varieties, small-scale irrigation, water harvesting, and cultivation techniques). There is a need for further studies.

**(Responses)**

- In rainfed upland ecologies, increase and stabilize the productivity of existing cultivated land, in part through the development of improved varieties with earlier-maturity, higher yield potential, and drought and cold tolerance: also try to maintain the fertility of soils.
- In irrigation schemes, give priority to improvements in the existing facilities. As for the development of new fields, a detailed study including maintenance capacity of the users should be considered before construction.
- In the lowland environment, develop new fields while establishing a development model for rice cultivation.

### **5.5 Strengthening agricultural extension work**

**(Issues)**

- In Africa, there is an absolute paucity of agricultural extension workers (exceeding 1,000 households per extension worker). As a result, high-yielding techniques often cannot be fully shared with farm households. In some cases, extension methods require updating to take advantage of the emergence of new technologies, new methods of communication, the increased role of the private sector, and other factors which allow for greater diffusion of improved production techniques among scattered groups of small-scale farmers where infrastructure is inadequate. So far, rice has not been a widely recommended crop in Africa, and many extension workers do not have enough knowledge about rice cultivation.

**(Responses)**

- Provide training on rice farming techniques and extension methods to extension workers
- Provide information and learning tools for farmers to link them to advisory services and knowledge hubs taking advantage of modern, affordable and practical village level ICTs.
- Diffuse the “farmer-to-farmer” approach in which the core farmer transmits techniques to farmers in his/her neighborhood by using a demonstration field: In such cases, make effective use of advanced farmers.

## **5.6 Expansion of access to funds for farm management**

### **(Issues)**

- Credit markets are not functioning satisfactorily in rural areas due in part to the difficulty in collecting revolving funds. As a consequence, it is not possible for farmers to get money necessary for, for example, purchasing fertilizers and machinery/equipment for agricultural production.

### **(Responses)**

- Analyze existing credit systems and investigate opportunities for creating new credit systems which offer easy accessibility to credit among small-scale farmers, and promote their introduction

## **5.7 Acquiring improved seed, fertilizers and machinery/equipment for agricultural production and improve their use**

### **(Issues)**

- Crop genetic improvement has served as a catalyst for green revolutions throughout the globe. Until African farmers have access to seed of improved, adapted rice varieties with acceptable quality traits, it will be difficult for them to compete with rice farmers around the world who are using highly-selected seeds for their local environments. Once bred, improved varieties need to be effectively disseminated alongside fertilizers in order to encourage farmers to grow rice efficiently.
- Soils in Africa are infertile in general. In addition to this, soil fertility has been lowered due to the conventional form of agriculture of depletive resource use, thereby making it difficult to maintain soil quality. In order to improve such conditions, it is necessary to use both organic fertilizers (compost, etc.) and chemical fertilizers in a proper combination. However, the prices of chemical fertilizers are much more expensive in Africa than those in other regions. Hence, small farmers find it difficult to apply chemical fertilizers. At the same time, many farmers do not have enough knowledge about the correct use of organic fertilizers, either.
- Generally, small-scale farmers till their land manually, which inflicts a heavy burden upon farmers and consequently puts a constraint upon increasing productivity.

### **(Responses)**

- Use local seed companies and input marketers (agro-dealers) to deliver seeds of improved

varieties into the hands of local farmers.

- **Develop and diffuse organic fertilizers by using materials readily available in the area (such as straws, hulls and animal wastes): In such a case, look into the applicability of the experience in Asia.**
- **Link closely to initiatives aimed at improving fertilizer marketing and distribution systems**
- **Study delivery system so that chemical fertilizers will reach farmers at lower prices, including the possibility of local production**
- **Study delivery system so that key agricultural machineries such as 2-wheel tractors, mobile diesel engines, threshers, and mills will reach farmers at lower prices, including the possibility of local production**

## **5.8 Post-harvest handling and marketing**

### **(Issues)**

- **In Africa, rice mills have not been developed in a sufficient number. Additionally, post-harvest handling at the level of farmers (threshing, drying and proper storage of paddy rice) is not done appropriately, either. Therefore, it is not possible to produce high-quality domestic rice (gravels being mixed, uneven grains and a lot of grain breakage), whereby they cannot compete with imported rice. Furthermore, neither a network of roads to transport harvests nor market information dissemination system to farmers has been fully developed.**

### **(Responses)**

- **Analyze the causes of quality deterioration and study improvement measures**
- **Improve post-harvest treatments by farmers: In this case, study, in cooperation with local private enterprises, the development and/or improvement of a thresher, a winnower and a mobile mill that can be locally manufactured**
- **Support rice mill owners and strengthen the competitiveness of domestic rice through improving its quality by using remodeled rice milling equipment**
- **Improve rural infrastructure such as village roads**
- **Build a market information dissemination system for farmers**

## **6. Action plan**

**(On the basis of issues raised and analyzed above, a more detailed discussion of the Action Plan is shown in ANNEX II)**

## **7. Asian experience**

**7.1 Rice is the main staple food in Asia and many Asian countries have a wealth of experience and knowledge about rice cultivation accumulated over centuries. Asia achieved a green revolution during the period 1960s - 1980s, and rice cultivation lay at the core. Thus, rice played a critical role in food security and poverty reduction in Asia. In the Asian “green revolution” the determining factor in increased production was the increased productivity of land through improvement of varieties, extended application of fertilizers and improvements in irrigation facilities.**

**7.2 Conditions prevailing in Africa and Asia are different in geography, climate, and socio-economy. Therefore Asia’s experience may not be automatically transferable as such. Nevertheless, it is believed that there is considerable room for cooperation and partnership that should be explored. In fact, Asia/Africa cooperation is already occurring in the area of rice in the form of South-South cooperation and within Asia-Africa solidarity, as enunciated in the Bandung Conference. Such trends should be further encouraged.**

## **Part B: Framework for Action**

### **(Principle)**

**8.1 A new architecture for the dramatic promotion of rice production in Africa should be designed flexibly and innovatively, to take into account the existing socio-economic and other conditions in different countries, sub-regions, and regions of Africa. It should be conceived and implemented in full respect of African ownership and leadership embodied in particular in CAADP, and with strong links to the Africa Rice Center (WARDA), the Forum for Agricultural Research in Africa (FARA) and networks such as the African Rice Initiative (ARI), the West and Central Africa Rice Research and Development Network (ROCARIZ) and the East and Central Africa Rice Research Network (ECARRN).**

### **(Implementation mechanism)**

**8.2 In order to achieve the ‘doubling target’ through an effective implementation of the initiative, a ‘Coalition for African Rice Development (CARD)’ will be formed as a consultative grouping of participating bilateral and multilateral donors and African and international institutions in order to work with interested African rice producing countries, in partnership. A steering committee will be formed within CARD.<sup>3</sup> The Regional Economic Communities (RECs) will be consulted as necessary, especially in the context of CAADP implementation.**

**8.3 The main functions of CARD will include:**

- Harmonization/coordination of policies and actions between CARD and African rice producing countries**
- Identification of high potential areas**
- Advocacy and resource mobilization**
- Information/knowledge sharing and dissemination of technologies**
- Facilitation of human and institutional capacity strengthening**
- Monitoring the progress of the Coalition initiative**

**8.4 CARD will be backed up by a small secretariat to be established and located**

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<sup>3</sup> AGRA, the Africa Rice Center (WARDA), FARA, NEPAD, IRRI, JIRCAS and JICA have expressed readiness to be members of the steering committee.

in the AGRA's headquarters in Nairobi.<sup>4</sup> The secretariat will support CARD through facilitating dialogue and consultations between CARD and African rice producing countries in the implementation of the Coalition initiative. It will also develop an internet-based network information system dedicated to the Coalition initiative. The secretariat will be assisted as necessary by the participating partners.

8.5 In the initial phases, CARD may select an initial set of 'pilot' countries (or groups of contiguous countries with similar rice production characteristics), taking into account the relevant factors such as national rice development policy and strategy, readiness of donor intervention, production growth potential, etc. The 'pilot' countries will submit their National Rice Development Strategy (NRDS) to CARD through the secretariat.<sup>5</sup> CARD can assist the countries in the preparation of the NRDS. The partners in CARD will harmonize/coordinate action in arriving at their respective assistance/support measures in response to the NRDS for greater synergy. The 'pilot' countries will be expanded in subsequent phases as appropriate.

(Time frame)

8.6 CARD will have its inaugural meeting within 6 months of the launch of the Coalition initiative and start its functions immediately, including the secretariat.

(Review)

8.7 CARD will review the Coalition initiative from time to time to ensure its comprehensive, strategic implementation and will be revised and improved as appropriate.

**END**

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<sup>4</sup> AGRA, JICA, and WARDA expressed the willingness to base staff to the secretariat.

<sup>5</sup> The pilot countries will be encouraged to commit to the CAADP Compact processes so that the Pilot activities will be scaled-up nationally.

### **Bibliography of the Cited Literature**

**J.C.Norman and E. Otoo.** 2002. Rice development strategies for food security in Africa. Proceedings of the 20th Session of the International Rice Commission. Bangkok, Thailand, 23-26 July 2002

**Yoko Kijima, Keijiro Otsuka, Dick Sserunkuuma.** 2008. Assessing the Impact of NERICA on Income and Poverty in Central and Western Uganda. Forthcoming in Agricultural Economics.

**Toshiyuki Wakatsuki.** 2007. Towards the realization of a green revolution through paddy rice development in West Africa: From experiences in Nube in Nigeria and Ashanti in Ghana; Faculty of Agriculture, Kinki University

## Glossary

### **Africa Rice Center (WARDA)**

**The Africa Rice Center (WARDA) is an autonomous intergovernmental and pan-African research for development organization working to contribute to poverty alleviation and food security in Africa through research, development and partnership activities aimed at increasing the productivity and profitability of the rice sector in ways that ensure the sustainability of the farming environment. WARDA's membership counts 21 African states from West, Central and East Africa. WARDA is also one of the 15 international agricultural research Centers supported by the Consultative Group on International Agricultural Research (CGIAR).**

### **AGRA**

**The Alliance for a Green Revolution in Africa (AGRA) is a dynamic partnership working across the continent to assist millions of small-scale farmers and their families lift themselves out of poverty and hunger through increased productivity and profitability. AGRA aids small-scale African farmers by focusing on environmentally sustainable improvements along the whole agriculture “value chain”-from seeds, soil health, and water to markets and agricultural education and policy. AGRA is headquartered in Nairobi, Kenya.**

### **CAADP**

**CAADP (Comprehensive Africa Agricultural Development Programme) is a framework for agriculture growth, food security, and rural development in Africa at the invitation of the NEPAD Steering Committee and the African Heads of State and Government in 2002.**

**It has the following specific targets for achievement by the year 2015; improve the productivity of agriculture to attain an average annual growth rate of 6 percent with particular attention to small-scale farmers especially to women; have dynamic agricultural markets within countries and between regions and improve access to markets to become a net exporter of agriculture products; achieve a more equitable distribution of wealth; be a strategic player in agricultural science and technology development; and practice environmentally sound production methods and natural resource**

management.

#### **FARA**

**FARA (Forum for Agricultural Research in Africa) is the technical arm of NEPAD and has the full support of the African Union (AU). FARA's vision is to reduce poverty in Africa as a result of sustainable broad-based agricultural growth and improved livelihoods, particularly of smallholder and pastoral enterprises.**

**Its mission is to create broad-based improvements in agricultural productivity, competitiveness and markets by supporting Africa's sub-regional organizations in strengthening capacity for agricultural innovation.**

**FARA does this through five networking support functions, that is, advocacy and resource mobilization, access to knowledge and technologies, regional policies and markets, capacity strengthening and partnerships and strategic alliances.**

**FARA works closely with a number of development partners, among them: the World Bank, the African Development Bank, the Rockefeller Foundation, Canadian International Development Agency (CIDA), USAID, European Union, DFID and a number of other multi- and bi-lateral donors.**

**FARA's programmes include Sub-Saharan Africa Challenge Programme (SSA CP), Strengthening Capacity for Agricultural Research and Development in Africa (SCARDA) and the Regional Agricultural Information and Learning System (RAILS), among others.**

#### **IRRI**

**The International Rice Research Institute (IRRI), supported by the Consultative Group on International Agricultural Research (CGIAR), is a nonprofit, autonomous organization engaged in research and training on rice-related technology. With headquarters in the Philippines, it is the oldest and largest international agricultural research institute in Asia with staff based in 14 countries in Asia and Africa. Its mission is to reduce poverty and hunger, improve the health of rice farmers and consumers, and ensure that rice production is environmentally sustainable. In partnership with national agricultural research and extension systems as well as farming communities and a range of international, regional, and local organizations, IRRI conducts research and provides training and education for those helping rice farmers by disseminating information and proven, sustainable technologies.**

## **JICA**

The Japan International Cooperation Agency (JICA) is an implementing body of the various components of Japan's Official Development Assistance (ODA) such as technical cooperation projects, acceptance of trainees and development studies. By the structural reform of governmental agencies, this October, JICA is merging with the Japan Bank for International Cooperation (JBIC), and will have additional functions such as yen loans and grant aid. With this restructure, JICA will become one of the world's largest bilateral development agencies and be able to offer not only the technical cooperation, but also grant aid and loan assistance, all "under one roof."

## **JIRCAS**

Japan International Research Center for Agricultural Sciences (JIRCAS) is an Incorporated Administrative Agency under the Ministry of Agriculture, Forestry and Fisheries of Japan. It is the sole national institute in Japan that undertakes comprehensive research on agriculture, forestry and fisheries technology in developing regions. Aiming at technology improvement in developing regions including Africa, JIRCAS conducts a wide range of collaborative research projects with national research centers, universities and international research centers in the region, in cooperation with related institutions in Japan including JICA. JIRCAS is acknowledged as a key partner and the focal point institution in Japan by CGIAR which supports IRRI and WARDA.

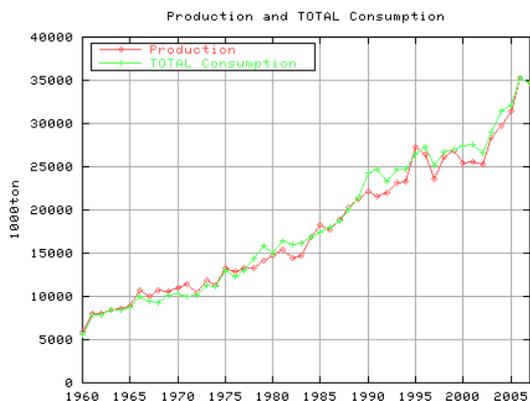
## **NEPAD**

NEPAD (New Partnership for Africa's Development) is a vision and comprehensive strategic framework for Africa's socio-economic development. It is a commitment of African leaders to African people and to the rest of the world to partner Africa in its own development on the basis of its own agenda and programme of action. The 37th Summit of the OAU in July 2001 formally adopted this strategic framework document. Its primary objectives are; to eradicate poverty; to place African countries, both individually and collectively, on a path of sustainable growth and development; to halt the marginalization of Africa in the globalization process and enhance its full and beneficial integration into the global economy; to accelerate the empowerment of women. Its steering committee comprises 20 AU member states to oversee projects and program development.

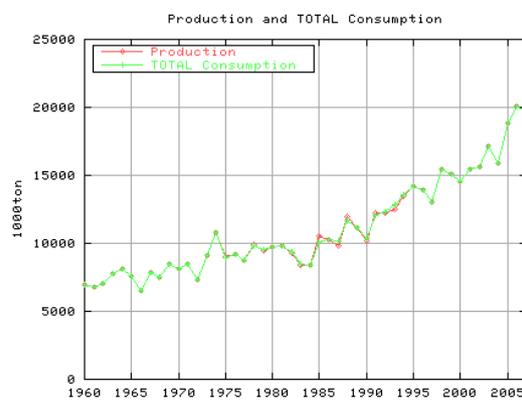
# Annex I : Figures and table

Figure 1: Production and consumption of major grains in Africa

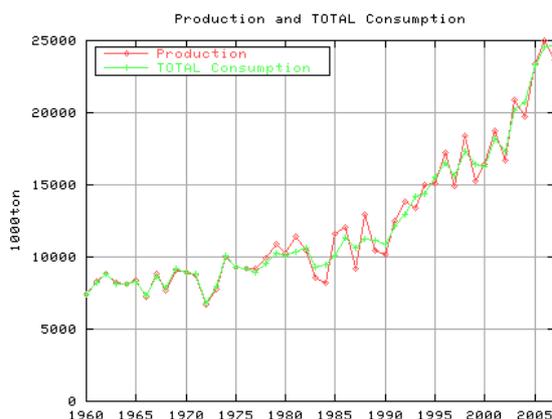
## Maize



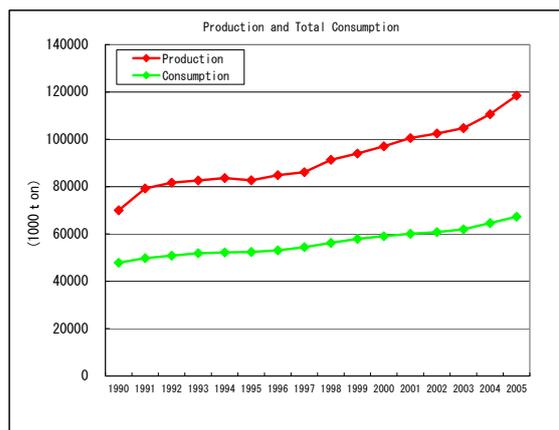
## Millet



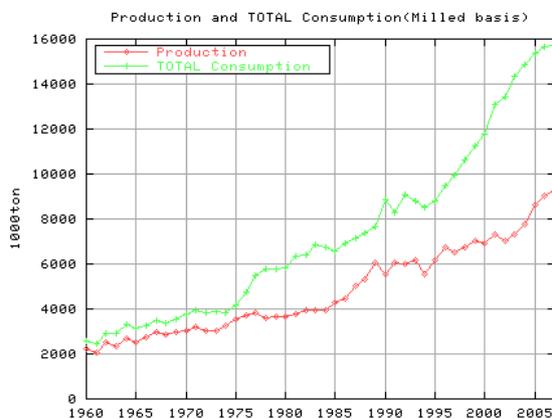
## Sorghum



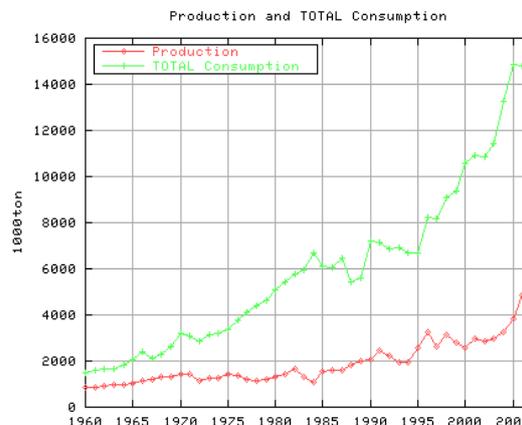
## Cassava



## Rice (Milled)



## Wheat

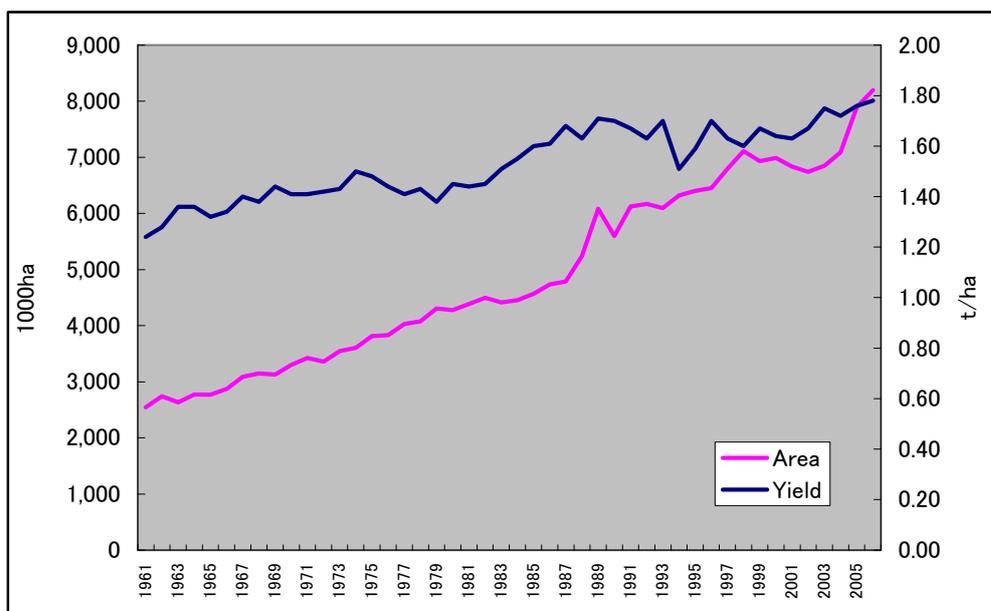


“World Food Statistics” prepared by Professor Ito, Faculty of Agriculture, Kyushu University  
<http://worldfood.apionet.or.jp>

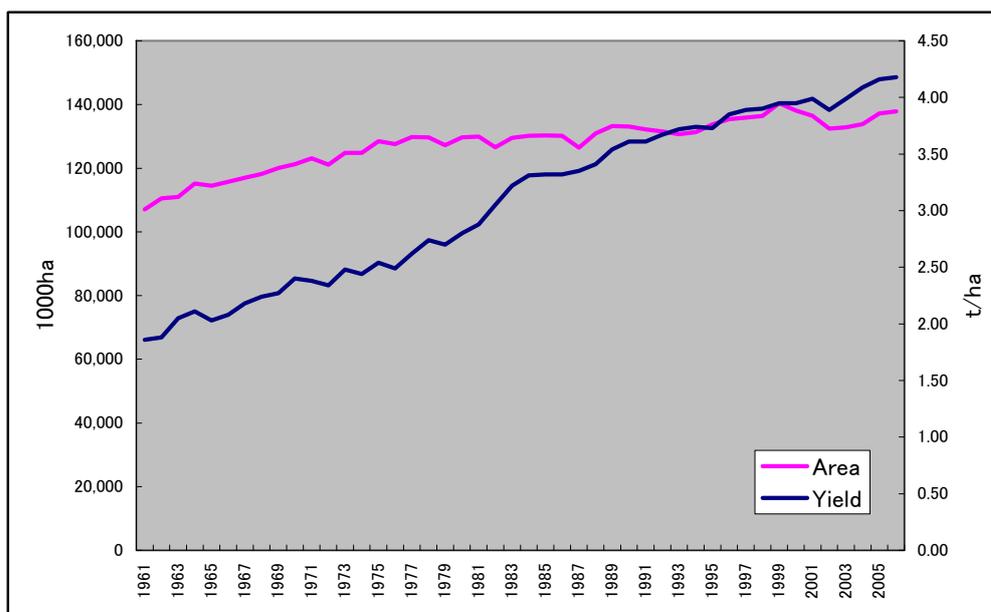
Data source : Population --International Data Base of the US Bureau of Census, August 2006  
Agricultural products --PS&D Online, January 2008 of the US Department of Agriculture

**Figure 2. Changes in rice production area and yield per unit area (Paddy basis)**

(1) Africa



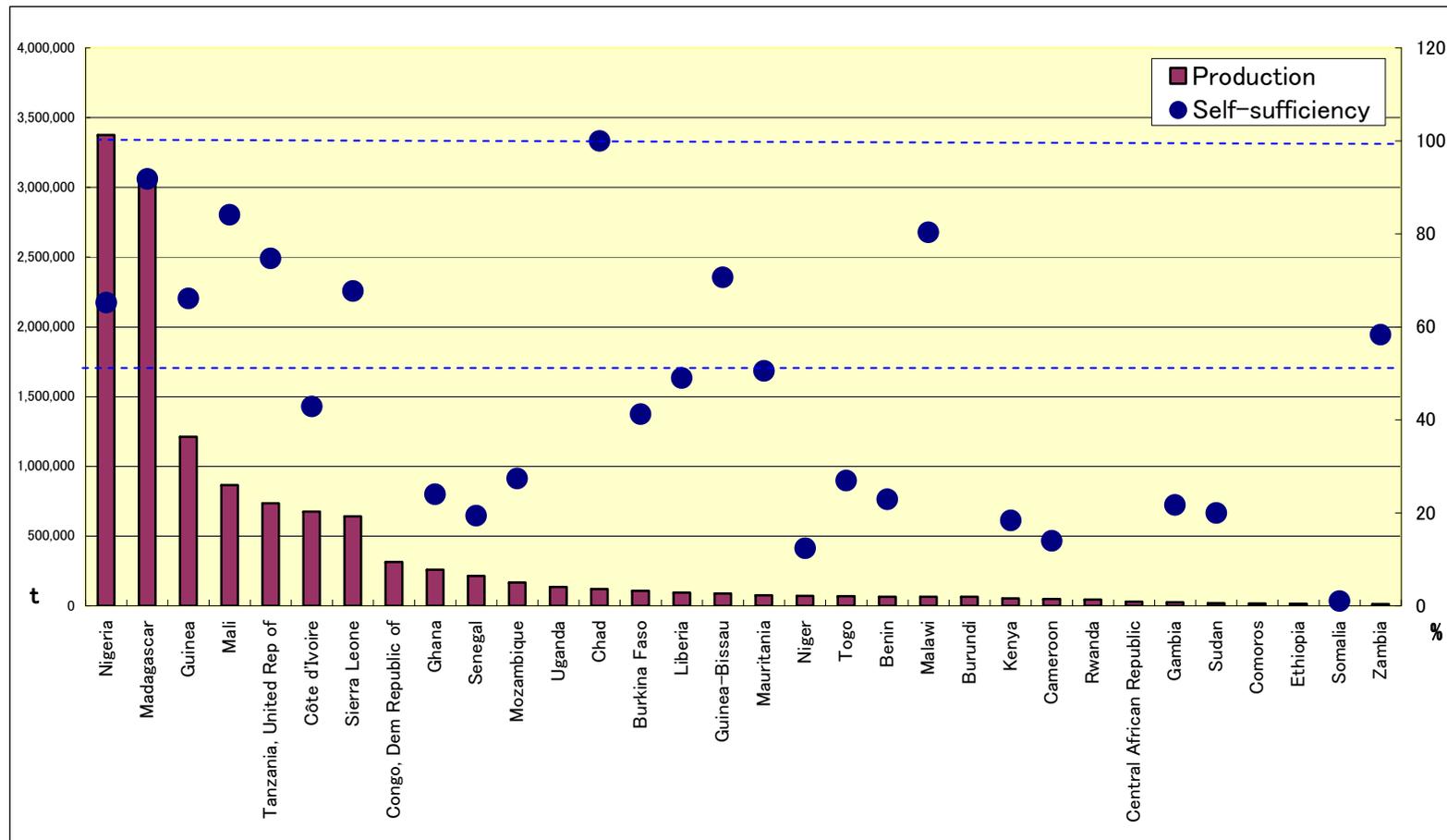
(2) Asia



FAOSTAT 1961-2006

**Figure 3. Production (Paddy basis) and self-sufficiency rate of rice in Africa**

(Listed are the countries that produce 10,000 tons or more)



The production is an average from 2002 to 2006 (FAOSTAT): The self-sufficiency rate is in 2006 (“World Food Statistics” prepared by Professor Ito, Faculty of Agriculture, Kyushu University)

**Table1. Model of actual state of rice production (Paddy basis) in Africa and its target value in 2017**

	Agro-ecology									Grand total		
	Irrigated field			Rainfed lowland			Rainfed upland					
Year	1.Cultivated land area (ha)	2.Yield per unit area (t)	3.Production (1x2) (t)	4. Cultivated land area (ha)	5.Yield per unit area (t/ha)	6.Production (3x4) (t)	7. Cultivated land area (ha)	8.Yield per unit area (t/ha)	9.Production (7x8) (t)	10. Cultivated land area (1+4+7)	11.Yield per unit area (12/10) (t/ha)	12.Production (3+6+9) (t)
2002/06	1,480,000	3.40	4,964,000	3,120,000	1.94	6,052,800	2,760,000	1.17	3,229,200	7,340,000	1.94	14,246,000
2017	1,730,000	5.00	8,650,000	5,000,000	2.90	14,500,000	3,000,000	1.80	5,400,000	9,730,000	2.93	28,550,000

Actual harvested area and Production (an average from 2002 to 2006) have been estimated based upon the data of FAOSTAT, etc. The target values of 2017 are predicated upon the assumptions that output will increase by 50% in each agro-ecology and that an area of cultivated farmlands will be expanded mainly in rainfed lowlands.

## **Annex II**

### **Action plan by Agro-ecology**

To increase the production and the productivity of rice in Africa, it is essential to improve the whole value chain analyzed in chapter 5. For this purpose, it is also essential to take different approaches according to the agro-ecology where rice is grown. The rice-growing area in Africa can be classified broadly into three groups: rainfed upland, irrigated field and rainfed lowland by ratios of approximately 38%, 20% and 42%, respectively (Chapter 5.4 of the document). Based on this recognition, in this annex II, an action plan is presented for each of the three groups of rice-planted area classified by agro-ecology, with analyses of issues and activities to be implemented.

#### **Rainfed upland (Upland NERICA Extension Plan)**

(Issues)

- Rice is grown in the rainfed upland as one of the crops in the crop rotation system. In this environment the yield is generally low (approximately 1.0 t/ha). WARDA and partners have developed a series of NERICA and sativa varieties that are well adapted to various African growth conditions. Some of these are resistant to diseases such as blast and bacterial leaf blight. NERICA varieties can achieve yields of about 3 t/ha under appropriate management and with good soil fertility.
- Agriculture in the rainfed upland is basically categorized as extensive and subsistent agriculture. It is a common practice not to apply fertilizers in growing rice in the rainfed upland areas; however, it is desirable to grow NERICA with fertilizers to increase production in the areas where rice can be expected to be grown as a cash crop.
- Similarly, NERICA is an important crop to hedge against the risk of drought or blight for small-scale farmers who are basically self-subsistent in food production as well. Therefore, in the rainfed upland the primary focus should be the extension of NERICA through the ARI mechanism.
- Because of the poor management of post-harvest processes, there is a significant loss in milled rice production and the quality of grains is generally low. In consequence, locally produced rice can not compete with imported rice.

**(Activities)**

- **Strengthen the capacity of rice researchers and extension workers**
- **Support the registration of NERICA and other improved varieties in each major rice producing country**
- **Study the areas suited for upland rice cultivation through analyzing meteorological and soil data**
- **Establish cultivation techniques of upland NERICA including cropping system with appropriate rotation of crops and disseminate them to each country**
- **In cases where NERICA introductions fail to achieve impact due to poor adaptation, explore potential for developing new NERICA with additional traits such as cold tolerance, etc.**
- **Facilitate multiplication of registered seed of improved varieties (NERICAs and others) at national agricultural institutes in each country; Support the production of certified seed by contract farmers and build a distribution system to farmers; Study the applicability of on-farm seed-multiplication techniques and disseminate them to rice farmers in Africa (community-based seed system developed by WARDA and Partners).**
- **Broaden the genetic base of the current pool of NERICA varieties and enhance resistance to both abiotic and biotic stresses**
- **Support research on verification of the impacts of introducing NERICA and other improved upland varieties to the crop rotation system in each area and the use of water harvesting**
- **Disseminate better agronomic practices and post-harvest management that will reduce post-harvest losses and enhance grain quality**
- **Develop a rice-value chain to enhance competitiveness of locally produced rice, involving farmers, rice millers, and traders.**

**Irrigated field**

**(Issues)**

- **Very important gaps exist between actual and potential yields that are obtained in irrigated systems in Africa; these gaps are due to sub-optimal crop management due to a range of socio-economic constraints, such as problems with access to inputs, lack of small-scale agricultural machinery or lack of knowledge on best-bet practices**
- **Cropping intensity can usually be enhanced, double cropping is often possible,**

but usually rare in irrigated systems in Africa

- **Diversification of rice-based farming systems is an important possibility that is usually ignored**
- **Some problems have been pointed out about the management of facilities in the existing irrigated field. Likewise, there are some cases in which facilities are run down and out of use because of the lack of maintenance. On the other hand, there are some areas where production exceeds 5 t/ha.**
- **Thus, high yields can be expected as long as irrigation facilities are kept in good conditions. In case of new development or rehabilitations of irrigated fields, it is necessary to consider the following two aspects from the time of planning: first, management of facilities as the physical aspect; second, support in establishing and strengthening a water-users association and the diffusion of an appropriate cultivation model as the intangible aspect.**
- **Because of the poor management of post-harvest process, there is a significant loss in milled rice production and the quality of grains is generally low. In consequence, locally produced rice can not compete with imported rice.**

**(Activities)**

- **Strengthen the capacity of rice researchers and extension workers**
- **Set up the irrigation development criteria and provide technical guidance to government-related personnel**
- **Carry out studies concerning new development or improvement of irrigation facilities in each country**
- **Develop new irrigation facilities and provide intangible assistance (establishment of a water-users association, technical guidance on rice cultivation, introduction of credit service and so on)**
- **Support the rehabilitation of the existing irrigation facilities and provide intangible assistance (strengthening the water-users association, technical guidance on rice cultivation, introduction of credit service and so on)**
- **Disseminate techniques of irrigated rice cultivation by adopting the methods such as action-research, participatory learning, and “farmer-to-farmer” approach**
- **Study the possibility of upland NERICA cultivation in the irrigated field where water supply is unstable**
- **Disseminate better agronomic practices and post-harvest management that will reduce post-harvest losses and enhance grain quality**

- **Development of a rice-value chain to enhance competitiveness of locally produced rice, involving farmers, rice millers, and traders.**

### **Rainfed lowland**

#### **(Issues)**

- **It is reported that there is an area of approximately 20 million hectares of lowlands suited for paddy fields in Africa. Rice has a comparative advantage over other crops in cultivation in lowlands and has high potentials for promotion in Africa. In addition, there are some other merits (for instance, it is possible to have its repeated cultivation on the same field, and output can be boosted if water control is secured, 1.5~4 t/ha).**
- **On the other hand, due to farmers' reluctance to cultivate lowlands as a traditional practice, the difficulty to plow swamps and difficult access to the field, farmers tend to stay away from farming in lowlands. In order to obtain high yields in lowlands, it is essential to improve water control through simple measures that can be implemented by the farmers themselves; in addition small scale agricultural machinery may be needed to aid with land preparation.**
- **At the same time, rice cultivation techniques have not yet been fully established for lowlands in Africa. As a result, it is required to create a development model for rice cultivation in rainfed lowlands including small-scale water control systems that can be built and maintained by farmers. Furthermore, it is also necessary to develop new farmlands.**
- **WARDA has developed a range of NERICA varieties (60) and other improved lowland varieties.**
- **Because of the poor management of post-harvest process, there is a significant loss in milled rice production and the quality of grains is generally low. In consequence, locally produced rice could not compete with imported rice.**

#### **(Activities)**

- **Strengthen the capacity of rice researchers and extension workers**
- **Strengthen activities concerning the development of high-quality varieties suitable for rainfed lowlands. Validate the applicability of the existing upland variety NERICA to rice cultivation in lowland.**
- **Develop a model for lowland rice cultivation that can be easily maintained and managed by farmers**

- **Carry out studies concerning the potential of lowland development in each country taking into consideration traditional practice and human health implication**
- **Support the development of lowlands for rice cultivation and provide intangible assistance (establishment of farmers' associations, technical guidance on rice cultivation, introduction of credit service and so on)**
- **Disseminate better agronomic practices and post-harvest management that will reduce post-harvest losses and enhance grain quality**
- **Development of a rice-value chain to enhance competitiveness of locally produced rice, involving farmers, rice millers, and traders.**
- **Consider opportunities to diversify rainfed lowlands (beyond rice)**

**(End)**