E. Session3 (NERICA)

1. Title: “Developing Path to Prosperity in the Sub-Saharan Africa: Dissemination of NERICA”
   Dr. Inussa AKINTAYO: African Rice Initiative Coordinator, WARDA
2. Title: “The Promotion and Dissemination Rice in Africa”
   Mr. Moctar Toure: Lead Agriculture Services Specialist, Africa Region, World Bank
3. Title: “Challenge for Improvement of Rice Productivity through Physio- Genetic Research in West Africa ”
   Dr. Junichi SAKAGAMI: Senior Researcher, Development Resource Division, JIRCAS (Japan International Research Center of Agricultural Science)
4. Title: “NERICA: The Guinea experience”
   Dr. Tareke BERHE: Country Director, Sasakawa Global 2000
5. Title: “JICA's Cooperation for Africa”
   Mr. Ryuzo NISHIMAKI: Senior Researcher (Rural Development), JICA

Developing Path to Prosperity in Sub-Saharan Africa: Dissemination of NERICA

Presented at the seminar on Promotion and Dissemination of Rice in Africa
Nairobi, Kenya, 10-11 February 2004

Inussa Akintayo
WARDA–The Africa Rice Center

INTRODUCTION

Nearly half of Sub-Saharan Africa's 615 million people live below the poverty line. Population growth rate exceeds the growth rate of regional food production.Rice represents the major staple food for the people of the region and its import represent 25% of total food import in WCA in value. The total cost of this import is over $1 billion dollars a year. The reduction of this huge import is a major objective of the sub-regional food policy. There is a hope that NERICA will contribute to achieve this goal.

NERICA : Its development

Oryza sativa

High yield potential, but low adaptation to rainfed uplands

Oryza glaberrima

Low yield (0.8 t/ha),
but highly stress resistant

Crossing African with Asian Rice

O. sativa **as female parent**

O. glaberrima **as male parent**

BC2F1 population from *O. sativa* x *O. glaberrima*

- Earlier maturity (by 30–50 days)
- Resistance to local stresses
- Higher yield
- Good taste

(IV)

New Interspecific in Farmers Field in Guinea

FROM LAB TO END USERS

- To quickly move the NERICA technology to farmers, WARDA and its partners have adopted PVS and CBSS approaches

- Through PVS and CBSS, NERICA varieties were successfully introduced and adopted in Guinea where it is contributing to the improvement of farmers' leaving conditions and incomes

CREATION OF THE AFRICAN RICE INITIATIVE (ARI)

- Successful dissemination of NERICA in Guinea, led to the creation of ARI by WARDA and its partners

CREATION OF ARI (cont'd)

- Historic Launching of ARI took place on 27 March 2002, under the sponsorship of the Government of Japan, UNDP/TCDC, Rockefeller Foundation, African Development Bank, and World Bank

STATUS OF NERICA DISSEMINATION:

Since its insertion in the mid-1990s, NERICA has carved a special niche for itself among upland rice farmers in SSA. It became a symbol of hope for food security.

In Guinea

- Up to 5 varieties (NERICA 1, NERICA 2, NERICA 3, NERICA 4 and NERICA 6) are adopted and cultivated by women and men with average yield of 2,5t/ha
- NERICA seed production association initiated
- Individual pilot seed producers are in NERICA seed business
- Recent loan and grant agreement with AfDB will help to reach more farmers and increase the production

In Guinea (cont'd)

- In Guinea, NERICA is produced by farmers' associations, mainly women

In Guinea (cont'd)

- Individual farmers are also in NERICA business


Successful Private NERICA Farmer in Guinea

In Côte d'Ivoire

- Two NERICA varieties are cultivated (NERICA 1 & NERICA 2)
- NERICA producers association organized
- Hunger alleviation projects based on NERICA are initiated
- NERICA project initiated to support schools feeding program.
- NERICA seed production project targeting 200,000 tons in 2004 initiated

In Nigeria

- One variety (NERICA 4) officially released in June 2003; many others in pipeline.
- Government signed 2 grants and loan agreements (nearly 70 millions dollars worth) with AfDB in July and December 2003 for NERICA production in Nigeria

The Gambia

- Up to 4 NERICA varieties are cultivated.
- Government with fertilizer and other inputs encourages farmers associations in NERICA production
- NERICA seed bank development initiated with UNDP support
- Dissemination enhanced by impressive media support
- With the loan and grant agreement signed with AfDB, more

Visiting a NERICA field in The Gambia

In Togo

- Four varieties are adopted: NERICA 1, 2, 3,4 and cultivated by individual farmers or seed producers associations

In Ghana and Benin

- Adoption of 2-3 varieties are reported. However the extend of cultivation is yet to be documented.
- Ghana and Benin are among the 7 countries that signed loan and grant agreement with AfDB for NERICA dissemination.

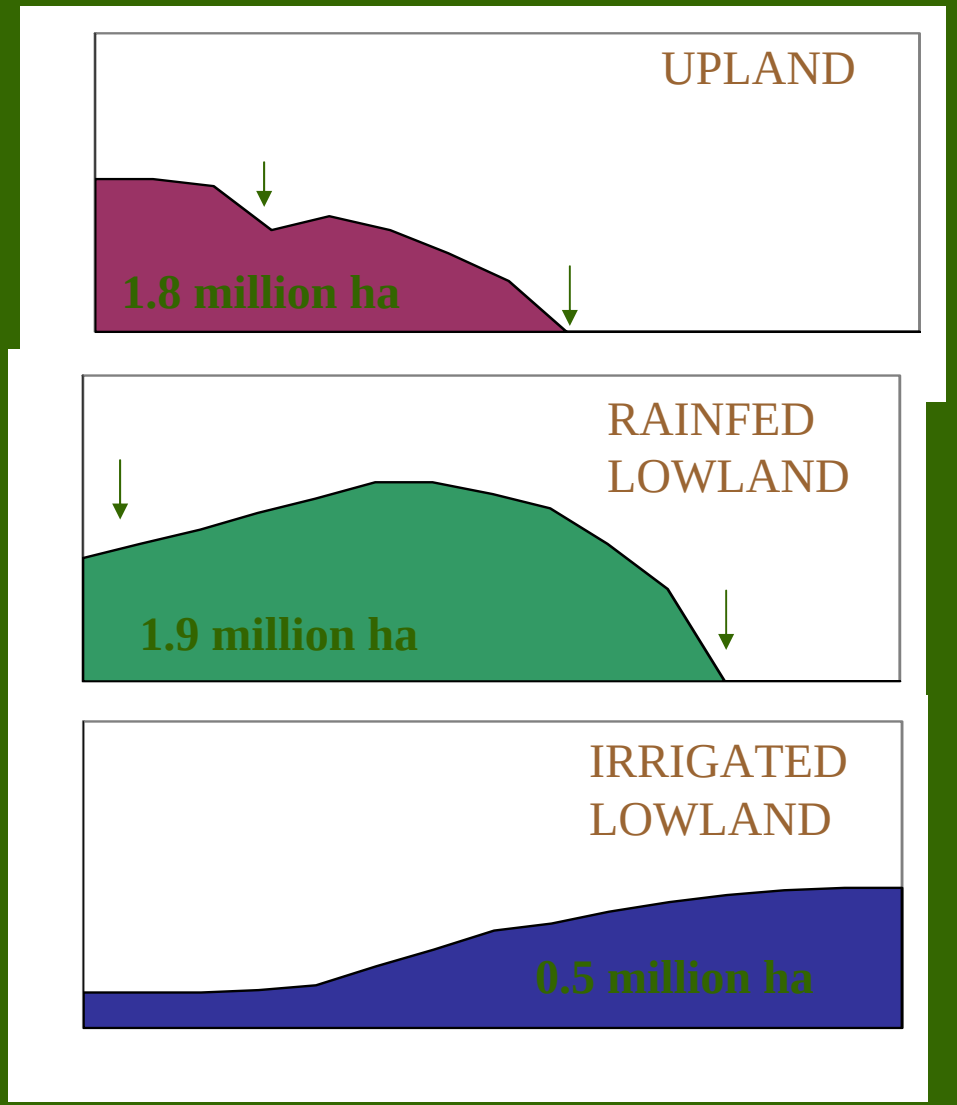
Outside of West Africa

* NERICA dissemination is not limited to West Africa alone. It is spreading in other parts of Africa

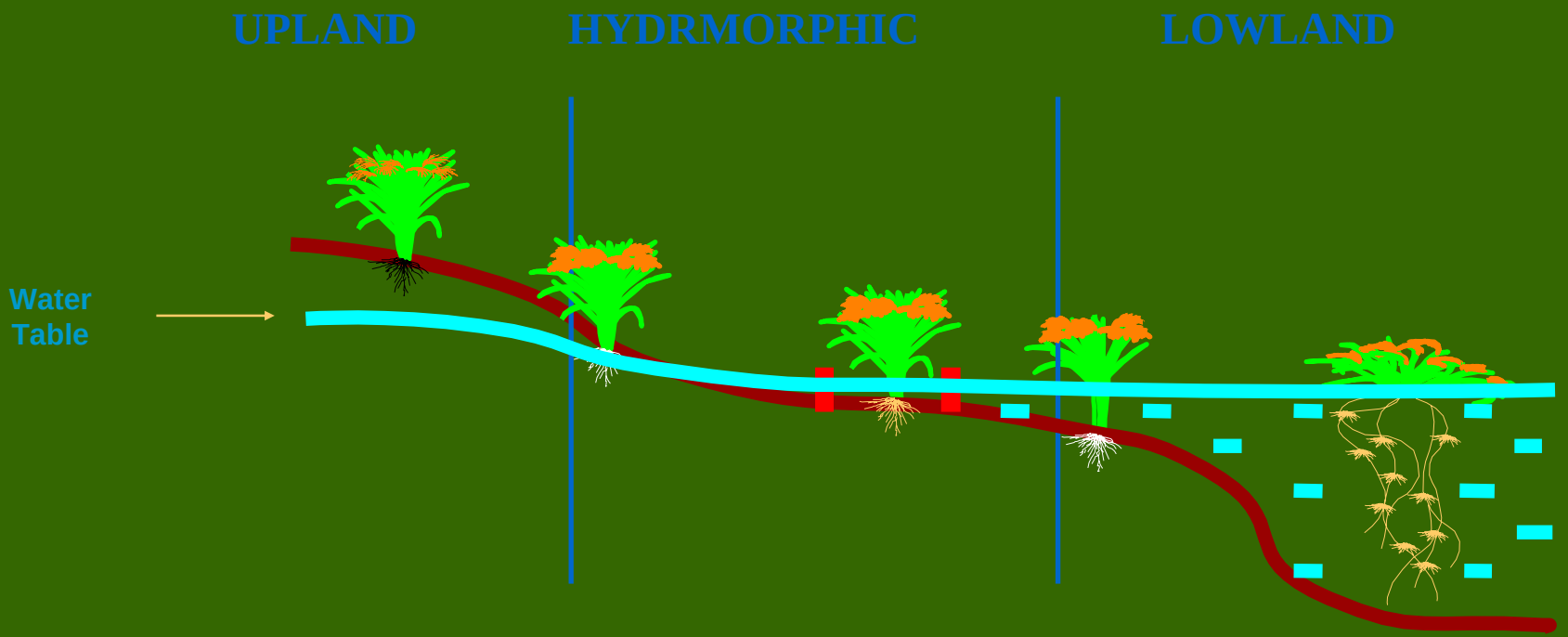
- NERICA lines are tested in Uganda and one variety named as SUPERICA is already released

- Several varieties are under evaluation in Tanzania, Kenya, Madagascar, Congo and Gabon

WHERE DO WE GROW NERICA?



WHERE DO WE GROW NERICA (cont-d)



PERSPECTIVES

1. NEW series of NERICAs on the move:

- Majority of NERICAs currently in use are from 450 series.
- We are now testing 880 series and very interesting materials (especially as resistance to diseases, high yields and earliness are concerned) are identified.
- Some cultivars from the new series are already tested and adopted in Burkina Faso. They will be sent to other NARS for PVS during 2004 rain season.

2. Complementary Technologies Development

- Due attention will be devoted to water-soil fertility management to enhance productivity and production
- Development of termites control methods will also be encouraged

3. Post-Harvest

- Special attention will be devoted to post–harvest and processing in order to increase NERICA competitiveness on the market and increased value added (Enhancement of market opportunities)

Post harvest(cond-t)
Cookies made from NERICA

EXTENSION OF ARI ACTIVITIES

PVS extended to more countries especially to Eastern Africa
By 2005

PVS visit at maturity phase with women

PVS visit at maturity phase with men

5.Inter-specific varieties for the lowland

- Intensive activities

are on-going on inter-specific material development for low-land.

- Promising materials

- with high yields,
- early maturing,
- resistant to the key

lowland stresses available.

- Successfully tested in B.Faso

They will be extended to more NARS starting from 2004

COLLABORATION WITH RESEARCH INSTITUTIONS?

- Participatory Approaches:
  - PVS (Participatory Variety Selection)
  - PLAR (Participatory learning and Action Research)
  - CBSS (Community base seed system)
- Thematic Training
- Visiting Fellows
- Internship
- Consultancies in rice research including inter-specific material development
- Exchange visit

RICE IS LIFE

THANK YOU ALL

Seminar on the Promotion and Dissemination Rice in Africa

Nairobi, Kenya, February 10-11, 2004

World Bank Statement

Mr. Chairman and dear colleagues.

I would like first to thank, on the behalf of the World Bank Management, JICA and the Kenyan Government for inviting us to take part in this very important meeting on the Promotion and Dissemination of the "new rice in Africa". It is for me an honor and a pleasure to be among those invited to make opening statements. I can recognize among the participants a number of "old friends" and companions in the NERICA conception, birth, and childhood process.

I would like, at the onset of this short statement, to reconfirm the Bank's interest and commitment to continue to support the NERICA promotion and dissemination process. As many may recall, the Bank was at the beginning of the large-scale dissemination process in Guinea, back in the mid 90's. Indeed the Bank, as the donor of the last resource within the CGIAR, has been along WARDA's side, way before the NERICA era, and intend to do so in the foreseeable future. The Bank is also one of the founding members of ARI.

NERICA has gained a very high profile within the Bank and in particular in its African region.

We are still figuring out how best to build a strong and lasting support through our lending portfolio. As you all know our granting capacity is quite low.

As a result we operate mostly at county level through project that target agricultural productivity enhancement objectives. Opportunity exist in these projects to build in NERICA promotion activities. These NERICA related activities could be linked either to research and extension components or to farmer empowerment ones. Such opportunities exist in all sub-regions of the continent and in particular in Eastern Africa in Kenya, Uganda, Tanzania and Ethiopia to name few countries.

At regional level the Bank is developing, in close collaboration with FARA, a Multi Country funding mechanism to support the implementation the agricultural productivity component of NEPAD's Comprehensive African Agricultural Development Program (CAADP). It is expected that a sizable budget would be earmarked for the implementation of the Program once completed and validated. NERICA would a logical candidate eligible for funding. I am sure that through NEPAD/FARA planned consultation process to validate this funding mechanism, all the countries interested to

see a strong support given to the promotion of NERICA will make their wishes well know.
Let me conclude this short statement by inviting to reflect, during the group discussions, on three issues that may influence the future of NERICA's promotion and dissemination effort: (i) the availability and accessibility of quality seeds. So far we have not been very successful in effort to establish effective and lasting seed multiplication, distribution and marketing systems; (ii) the consolidation and protection of the genetic attributes of the NERICA varieties. Effort should be made to anticipate genetic breakdown and lost of the attributes that make NERICAs unique. So more research will be needed; and (iii) the continuous degradation of the natural resource base, in particular the loss of soil fertility and water scarcity and management issues.

Once again thanks and congratulations to the organizers and host for bringing together such a distinguished gathering to reflect and guide on the future of Rice in Africa.

Challenge for Improvement of Rice Productivity through Physio- Genetic Research in West Africa

Jun-Ichi Sakagami* and Hiroshi Tsunematsu

Japan International Research Center for Agricultural Sciences

1-1 Ohwashi, Tsukuba 305-8686,JAPAN

The demand for rice in Sub-Saharan Africa is growing rapidly in compare with another continents, however rice productivity did not increase in 1990's. Environmental limiting factors are drought, water logging and floods, weeds, salinity, iron toxicity, soil fertility and disease and pest. Rice production in Africa is largely based on the rainfed ecosystem and vulnerable in a number of constraints. One of the major constraints under the ecosystem is drought and it is necessary to develop rice varieties with drought tolerance and crop management adaptable to drought conditions.

For genetic studies and breeding of drought tolerant varieties, it is necessary to know the diversity of this complicated trait. We evaluated a total of 455 accessions/lines, including 260 Asian accessions provided by International Rice Research Institute (IRRI) and Ibaraki Agricultural Center, 86 African accessions stocked at WARDA, and 109 NERICA lines. At 45 days after interruption of irrigation (60 days after seeding), response of each accession was evaluated according to the Standard Evaluation System developed by IRRI. From the evaluation, seven varieties were selected as candidate donors for drought tolerance.

These seven varieties and NERICA 1・2・3・4 were tested under dry condition (pF2.0 to 2.5) to evaluate of drought tolerance in aspect of deep rooted ability, and agricultural traits resulting response to drought. In conclusion, deepest root length had a close relation to transpiration rate, and might be an indicator of drought tolerance. However careful consideration must be given to evaluate drought tolerance by comparison of yield and yield components. The research target of rice production included development of NERICA are; (1) development of sustainable farming system with low input, (2) development of the optimum fertilizer management to reduce the yield gap, and (3) improvement of varieties with drought tolerance and competitive to weeds in rainfed ecosystem.

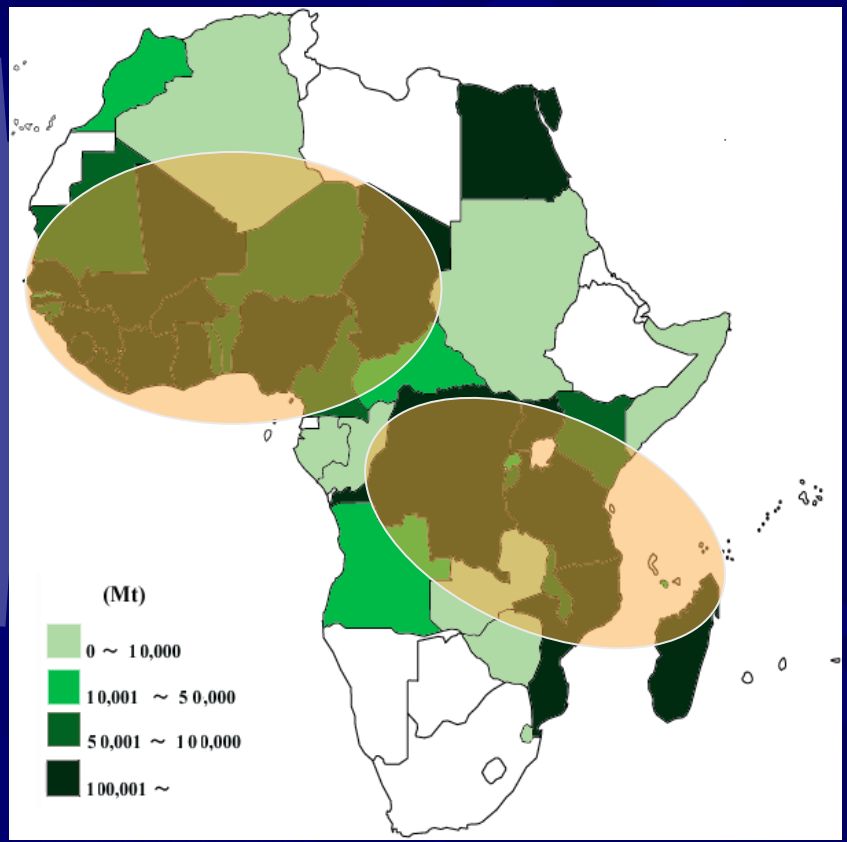
We plan for new research project on improvement of rice varieties and development of crop management in rainfed ecosystem in West Africa. Plan of the project will be presented in this seminar.

Challenges for the Improvement of Rice Productivity through Physio- Genetic Research in West Africa

Jun-Ichi Sakagami*,

Hiroshi Tsunematsu

Situations of rice production in Africa



Rice production (t)

Major rice-ecosystem in West Africa		
Country	Cultivated area (%)	Improved varieties (%)
Irrigation (12%)		
Mauritania	100	100
Cameroon	86	100
Niger	57	100
Sénégal	45	100
Raifed lowland (38%)		
Chad	84	na
Benin	81	40
Ghana	81	na
Burkina Faso	64	35
Liberia	57	na
Nigeria	50	95
Raifed upland (40%)		
Côte d'Ivoire	74	40
Sierra Leone	67	13
Guinea	58	5
Togo	64	30
Mangrove (4%)		
Gambia	65	43
Guinea Bissau	48	10
Inundation (7%)		
Mali	40	na

na:unknown

Major factors limiting rice yield in Africa

- Drought
- Flood
- Weed
- Soil fertility
- Disease and pest
- Salinity
- Iron toxicity

Research target on water stresses

- Water-efficient and stress-tolerant rice;

  Development of drought tolerant varieties under rainfed condition.

  Development of tolerant varieties to flooding.

- Mechanism of water supply and productivity on rice;

  Analysis of mechanism on water stresses during sensitive stages, and development of appropriate water management under rainfed condition.

- Farmer practices for water use;

  Improvement of water management practices harmonized with the varieties and rainfall pattern.

Expected impact of the research

- New, efficient and useful rice varieties that tolerate water stresses.
- Sustainable rice cultivation system with low cost and water efficient.
- Water control technology for farmers.

Research on drought tolerant varieties by JIRCAS

- Objectives:

  To evaluate the drought tolerance of rice varieties

  To evaluate the response of deep rooting varieties to drought

- Materials:
  - Location; Bouaké, Côte d'Ivoire (WARDA)
  - Plant materials; 260 Asian rice
    86 African rice
    109 NERICA

Results of the research

⇒ Irrigated for 14 days after seeding (DAS)

⇒ From 15 to 60 DAS treated drought condition by non irrigation

⇒ Drought response were scored by Standard Evaluation System (IRRI)

⇒ Seven varieties were selected as candidate donors for drought

Accessions highly tolerant to drought

- Azucena (Philippines)
- Short Grain (Thailand)
- LAC23 (Liberia)
- Kinandang Patong (Philippines)
- Ma Hae (Thailand)
- Black Gora (India)
- Trembese (Indonesia)

Targeted trait: Deep rooting ability

Yumenohatamochi has higher productivity under the dry condition with deeper roots in Japan

Hypothesis

- Length of root under dry conditions may be an indicator of drought tolerance.
- Difference in temperature between air and surface of leaf blade expresses transpiration rate.

Growth observations

Observation of agronomic traits

Experimental field

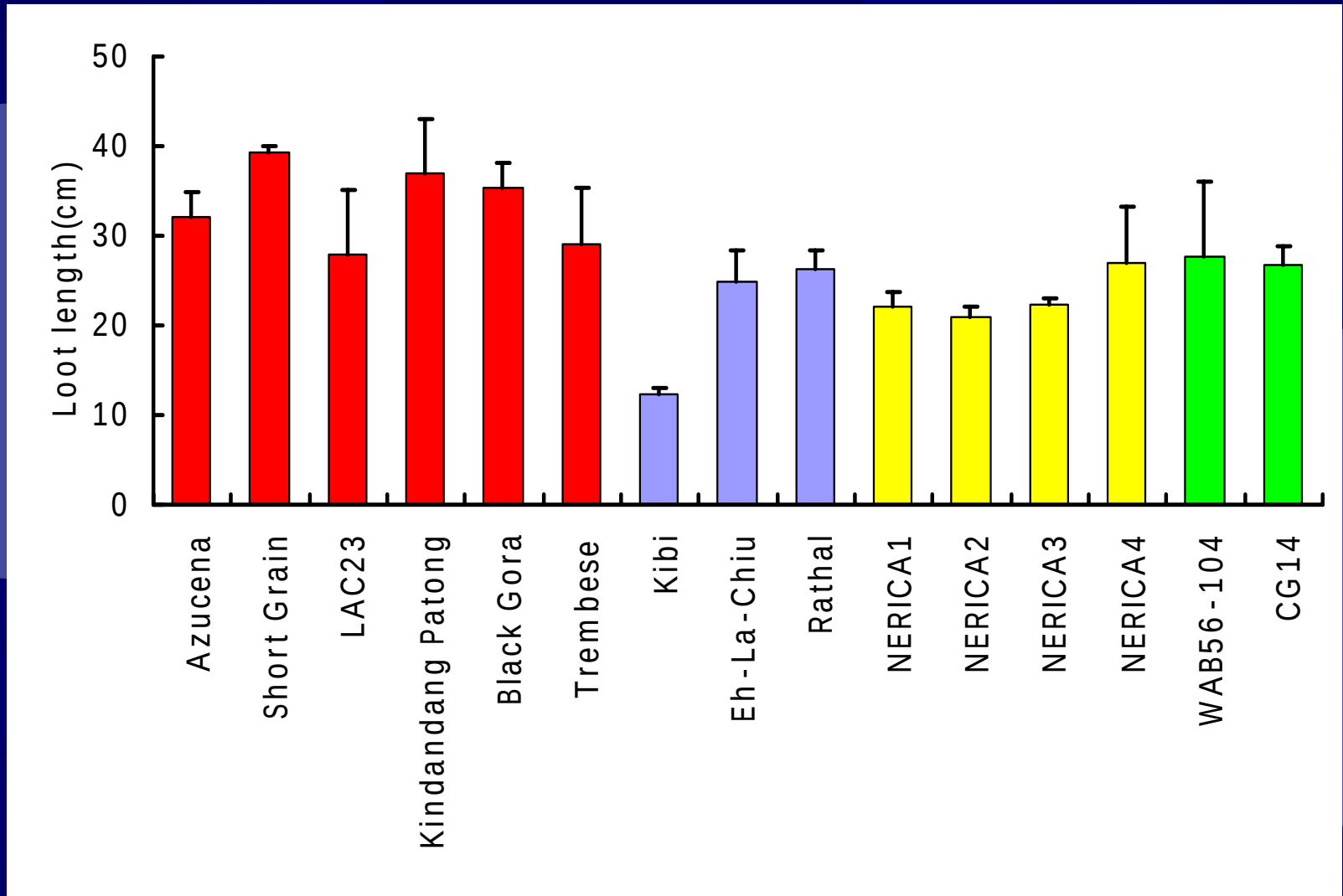
Roots density

Roots system

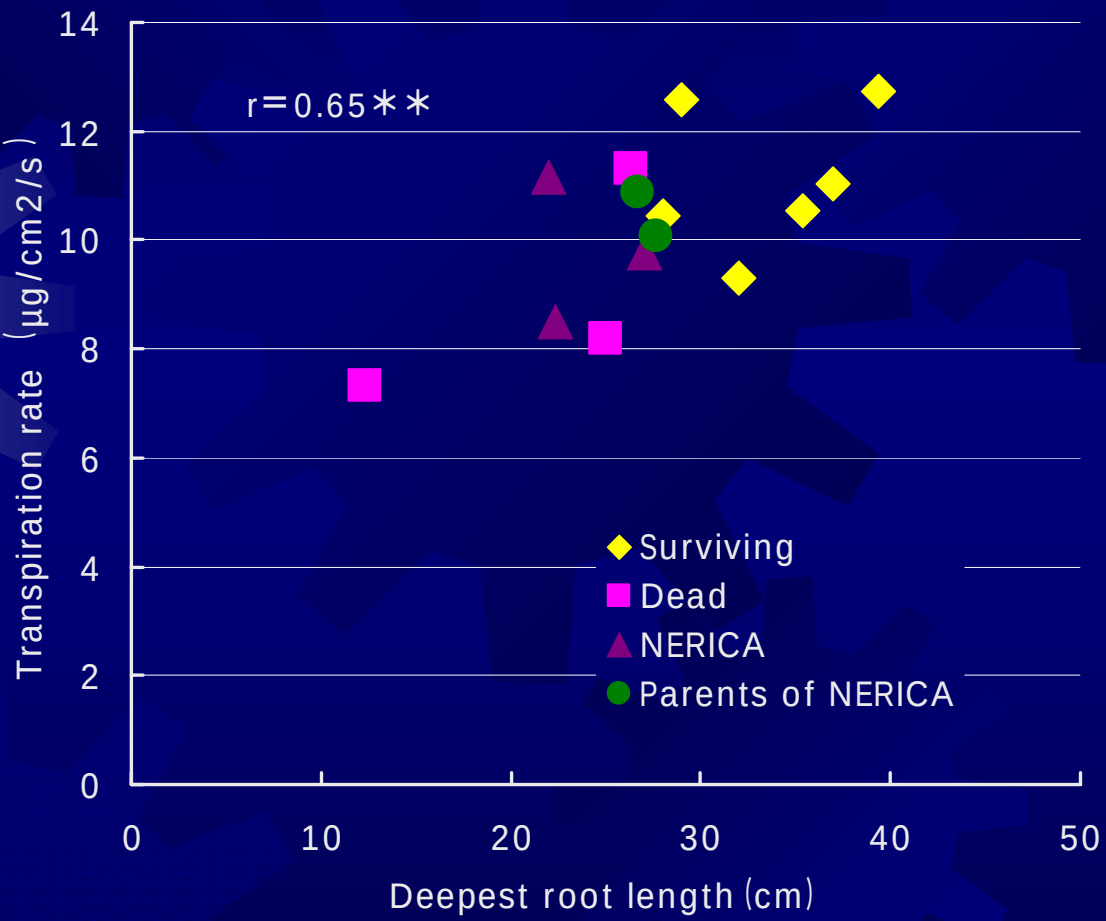
Transpiration rate

Leaf temperature

Deep rooting ability



Relationship between root length and transpiration rate



Conclusion of the study

- Root length was related to transpiration rate.
- Deep rooting ability was an indicator of drought tolerance and surviving strategy of rice plant in the dry condition.
- Some of NERICAs were non-deep rooting and low transpiration rate under dry condition.
- Studies on the relationships between deep rooting ability and yield will be necessary.

Growth of NERICA in farmer's field in Guinea

2003~2004
Eight farmers upland field
NERICA1 to 4

Results :
1.Early maturing(94days)
2.Short plant length(<1m)
3.Low spikelets number
(94 to 140/panicle)

Research target for NERICAs

- Development of sustainable farming system based on early maturing.
- Development of optimum crop management to reduce the yield gap.
- Development of varieties with weed competitiveness and higher productivity in lowland.

New project of improvement of rice productivity by physio- genetic approach in West Africa

(Issues in Africa)

Low productivity

- Luck of appropriate varieties
- Large fluctuation of yield
- Deficiency of low input management
- Failure of large-scale development

(Needs of rice production)

- Low self-sufficiency ratio
- Rice consumption on the rise
- Improvement of productivity in lowland
- Sustainability of cultivation system

(Genetic studies)

- Genetic resource enhancement
- Establishment of selection method
- Genetic analysis

(Physiological studies)

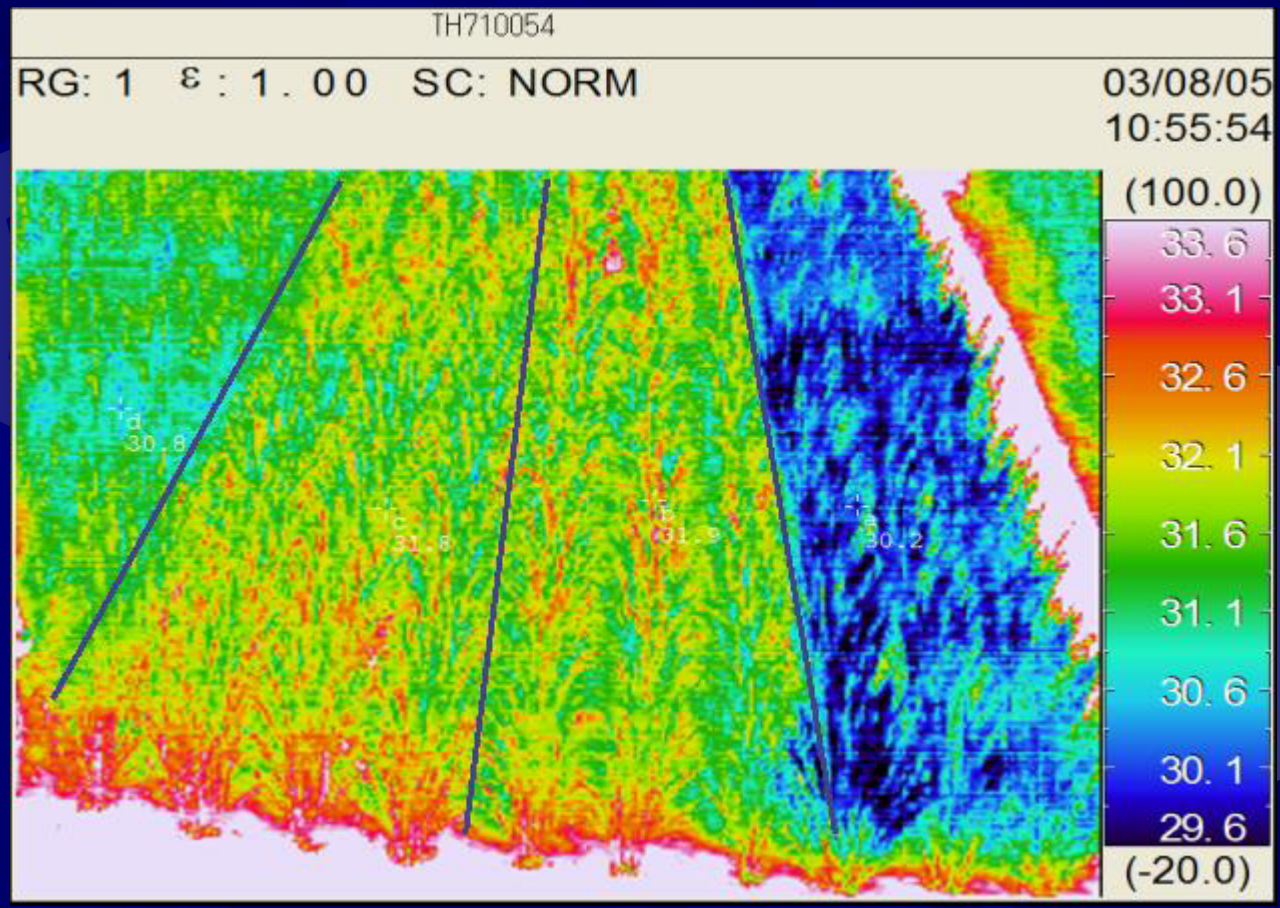
- Mechanism of tolerance to water stress
- Integrated weed management
- Sustainable production system

Development of varieties and cultivation system harmonized with African agro-ecosystem

Plan of the research in 2004

- Genetic studies on drought tolerance of rice
  - Trial for drought tolerance in seedling stage
  - Screening of deep rooting system
  - Screening of drought tolerance in reproductive stage
- Analysis of agronomic mechanism to water stress in rainfed lowland ecosystem
  - Development of evaluation system of drought tolerance at sensitive stages
  - Analysis of the effects of flooding at seedling stage on growth and yield
  - Investigation of weeds ecologies

Physiological analysis on drought by thermographical evaluation



Thank you for your attention!!

REPUBLIC OF GUINEA

MINISTRY OF AGRICULTURE AND LIVESTOCK

Departments of National Research, Extension and Rural Development
and
Sasakawa Global 2000/Guinea Agricultural Project

NERICA : THE GUINEA EXPERIENCE

NERICA RICE : THE GUINEA EXPERIENCE

by

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SUMMARY

NERICA is an abbreviation of New Rice for Africa, a name given for the new races of rice created by the West African Rice Research Development Association (WARDA) whose seat was till the year 2002 at M'be, 35 kms west of Bouake in Ivory Coast and currently is in Bamako, Mali . WARDA succeeded in developing the NERICAs by crossbreeding two closely related species of rice, Oryza sativa (Asiatic rice) and Oryza glaberrima (African rice) thus combining multiple good traits from the two parents in one. The engineer of this success was Dr. Monty Jones, a Sierra Leonian.

Source: WARDA

Figure 1. Dr. Monty P. Jones (Papa NERICA) in a NERICA field

Introduced to Guinea in 1997, the NERICAs now cover hundreds of thousands of hectares. There are several important reasons that resulted in the rapid adoption some of which are:

1), the importance of rice as a main staple food in Guinea; 2) the willingness and commitment of the Guinean Government to make rice production as a priority for achieving food security, 3) the multi-institutional interest – initial push came from WB and WARDA) and collaborative efforts put in place by different departments of the Guinean Ministry of Agriculture, 4) the introduction and strict application of new approaches to the transfer of technologies adopted by WARDA, The World Bank and Guinean NARES , 5) the additional support to Research and Extension with accessibility to inputs to producers made possible by the NGO, SG2000 and 6), the participation of Guinean farmers in the testing and selection of the NERICAs and 7), the good performance of the NERICAs themselves. In summary, the Guinean success was not a matter of chance but as a result of a combination of many factors : political will on the side of the Guinean Government, new approaches initiated by SNPRV, IRAG, BCPA,WARDA and the World Bank, availability of financial support from several donors (WB, Japanese Government, IFAD, SG2000), production of quality seed through CBSS, access to inputs and large plot demonstrations on farmers' fields made possible by SG2000, commitment and hard work of experts in the Guinean NARES and the willingness of the Guinean farmers to accept and adopt the new varieties.

Rice is the most important staple food crop of Guinea (90kg/head/year – highest in W. and Central Africa). Guinea is surpassed in area under rice only by Nigeria (ARI 2002, Rice Stat). 69% of the rice is produced under upland rain-fed conditions (Billo et Conde 1999). NERICAs are upland rain-fed rice. The method of variety selection known as Unites Experimentales Paysanes (UEPs) which was practiced in Guinea and a new approach known as Participatory Variety election introduced by WARDA where farmers are allowed to select varieties they like greatly contributed to the quick adoption of the NERICA varieties. A simple and convenient Community-Based Seed Production System (CBSS) put in place by WARDA also helped in making good seed available to farmers. NERICAs have at least 25-50% yield advantage over local varieties without additional inputs and a much higher advantage when inputs are used. The NERICAs are environmentally friendly and will also benefit women.

Guinean farmers like the NERICA varieties because of their earliness, high yield, tolerance to many biological, environmental and climatic stresses, acceptable plant characteristics for harvesting and good culinary qualities. All of these mean more food, good nutrition and additional income at a very critical period of the year-the hunger period. Five of the seven NERICA varieties (1,2,3,4, 6)have been selected for different ecological zones of Guinea and are now in the hands of farmers. The Guinea NERICA program is a collaborative effort by the Government of Guinea, WARDA, WB, IFAD, UNDP, Japanese Embassy to Guinea and an Americo-Japanese NGO, SG/2000 Agricultural Project.

In addition to the successful production and promotion of the NERICAs in the Country, Guinea has during 1999-2003 supplied more than 15 tons of NERICA Seeds to Gambia, Sierra Leone, Mali, Malawi, Uganda, Ethiopia, Nigeria and Tanzania.

ACCRONYMS

ADRAO : WARDA
ARI : African Rice Initiative
APEK : Association for Kindia's Econmic Promotion (NGO)
BCPA : Office of Agricultural Policy
BURISEM : International Bureau for Seeds
CBSS : Community-Based Seed Production System
IITA : International Institute for Tropical Agriculture
IFAD : International Fund for Agricultural Development
JICA : Japanese International Cooperative Association
IRAG : Institut de Recherche Agronomique de Guin'ee (National Agronomic Research)
NARES : National Agricultural Research and Extension Systems
NGO : Non-Governmental Organization
OP : Farmers Organization
PADS : Participatory Adaptation and Diffusion of Technologies for Rice Based Systems
PASAL : Projet d'Appui 'a la Securite Alimentaire (Food Security Project, French)
PTP : Production Test Plot
PVS : Participatory Varietal Selection
ROCARIZ : Reseau Ouest et Centre Africa du Riz-West and Central Africa Rice Network.
SAA : Sasakawa Africa Association (Tokyo, Japan)
SAQ : Seed of Acceptable Quality
SARA : Network Structure for Assisting Farmers (NGO)
SG2000 : Sasakawa Global 2000

SNPRV : Service National de la promotion Rurale et de la Vulgarisation (National Extension)
SPAAR : Special Program for Agricultural Research in Africa
UEP : Unite Experimentale Payssanne
UNDP : United Nations Development Program
WARDA : West African Rice Development Association
WB : The World Bank

ACKNOWLEDGEMENTS

The contribution of the following individuals and institutions is worth noting:

1. **WARDA and its staff for the creation of the NERICAs and training Guinean experts both at WARDA and in Guinea. Notable contributors in this efforts were Drs. Monty Jones and Ahmadou Beye.**

2. **The World Bank: its former SPAAR Dirctor, Dr. Mouctar Toure and its Research and Extension Expert for Guinea at that time, Mr. Joseph Toledano both of who played a leading role in initiating and financing hundreds of on-farm trials in 16 districts during 1997 and 1998.**

3. **Guinean Government : the Ministry of Agriculture led by the Honorable Minister, Mr. Jean Paul Sarr accepted to receive the new technologies and mandated its National Researchers (led by Dr. Barry B. Billo) and Extension staff (led by Mr. Aly Conde)to test the new material nation-wide. Mr. Babagalle Camara, Director of Extension Service and Dr. Sekou Cisse, Director of National Agronomic Research who played critical roles by providing technical, financial and political supports to the promotion of NERICA activities.**

4. **Guinean Farmers: hundreds of Guinean farmers actively and enthusiastically participated in testing and selecting the best NERICA varieties which they considered fit for their ecologies plus thousands who participated in observing .**

5. **IFAD: Provided US$20,000/year during 2000-2003 for PADS**

6. **Japanese Government: provided US$425,000.00 in 2002/2003 for the CBSS project. These funds were funneled through the UNDP Office in Guinea. In addition, the Japanese Embassy in Conakry is currently financing a pilot project on NERICA rice based cottage industry at a cost of US$81,000.00.**

   Special acknowledgements go to the then Japanese Ambassador to Guinea, his Excellenycy, Mr. Kyuya Komatsu for his high interest in promoting and support of the NERICA program.

7. **SAA/Tokyo: Mr. Masataka Minagawa and Mr. Christopher Dowswell accompanied by Dr. Tareke Berhe, SG2000/Guinea Country Director visited WARDA during 1997/98 and also in 2000 for the purpose of strengthening collaboration on seed production and field demonstrations of NERICA in Guinea. SAA provided US$ 50,000.00 as additional budget to SG2000/Guinea for NERICA seed Production and field demonstrations in 2000.**

8. **SG2000/Guinea: for allocating over US$200,000.00 of its budget for NERICA related activities during 1998 and 2003 and also for assigning one of its vehicles to the**

National NERICA Coordinator for the period of 1999-2002.

I. INTRODUCTION

The rapid adoption of the NERICAs in West and elsewhere in Africa has started creating many questions in the minds of people. The most frequent questions posed are : What is NERICA? Are the NERICAs Genetically Modified Organisms (varieties)? Are the NERICAs hybrids (in the sense that male- fertile and –sterile lines are needed to produce seed as in the case of maize)? In what way are they different from earlier existing rain fed upland varieties? and how did Guinea succeed in implementing an extensive and rapid promotion and adoption of these rice varieties?

The objective of this report is therefore, to provide answers to the above and other questions in the simplest language possible. It is not a technical report. It is meant for the general public. The report includes sequential information on the introduction of the NERICAs from WARDA to Guinea, their extensive adaptation test by National Research and Extension with farmer participation, efforts put in developing a Community Based Seed Production System and finally current efforts on developing a Rice Based Cottage Industry . Factual data is presented in Tables, graphs. Color photos are included to enhance the understanding of the reader. Some important references and appendices are also listed at the end. Most of the referenced documents can be obtained by a direct request from WARDA at the following address or by referring to the web-site:

WARDA/ADRAO, 01 B.P. 4029, Abidjan 01, Cote d'Ivoire. Telephone +225 22 41 06 06; Fax : + 225 22 41 07 e-mail: warda@cgiar.org; Web-site: http://www.cgiar.org/warda. Additional request for information can be addressed directly to the authors addresses provided at the beginning of this report.

We, believe that the NERICAs will play a vital role in contributing to poverty alleviation and enhancing food security in Sub-Saharan Africa. Moreover, the NERICAs will immensely contribute to improving the condition of village women, improve family nutrition and also reducing environmental degradation caused by " Slash an Burn " system of agriculture. Hence, it is important that they are well understood by everyone. It is our earnest hope that the information contained in this report will contribute to a better understanding and increased use of the NERICAs. We also hope that these report will serve as an example for other countries with similar experiences with the NERICAs to write their stories.

Any omissions of information , mis-representation and/or other errors are un-intentional. The authors accept full responsibility.

II. IMPORTANCE OF UPLAND RICE IN GUINEA

The traditional method of growing upland rain-fed rice in Guinea is through a system of " Slash and Burn " as demonstrated in the photos below.

Figure 2. Photos showing the sequence of activities in a "Slash and Burn " system that finally lead to degraded and abandoned soils as a result of increased population and short fallow periods.

This system is not environmentally friendly when there is a rapid population increase. With higher population, less and less area for agriculture becomes available and as a result natural fallow periods become shorter and shorter. The soils become degraded and have to be abandoned (see photo bottom right). It is hoped that the arrival of the NERICAs will greatly improve the situation. The high productivity potential of these new rice varieties will permit production under intensified systems thus enabling itinerant farmers to be sedentary and reducing their need to slash and burn new areas every year.

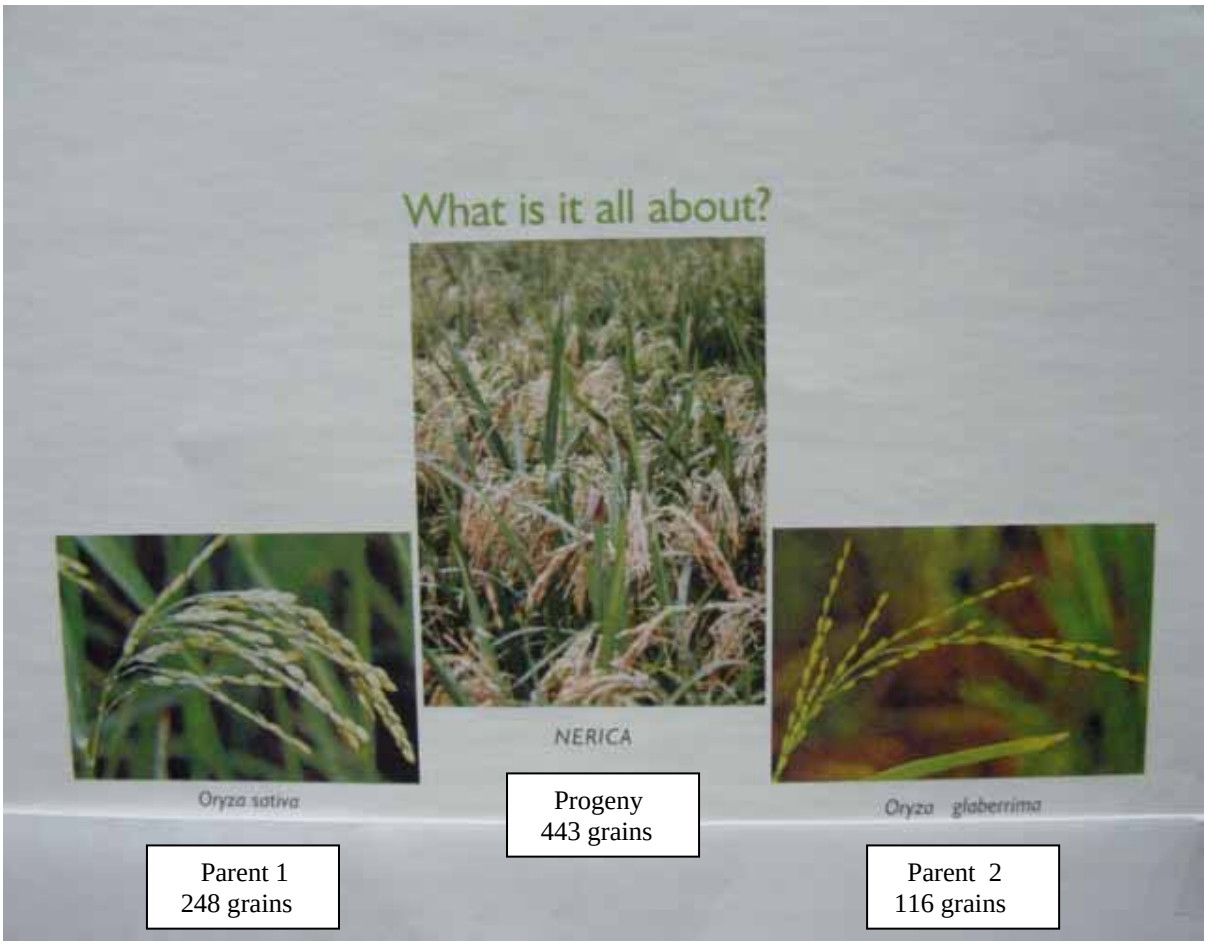
III. WHAT IS NERICA?

NERICA is an abbreviated name formed from the phrase " New Rice for Africa." It is a name given to new types of rice varieties created by WARDA through crossing two closely related species – an African rice scientifically known as Oryza glaberrima Steud. and the Asiatic rice, Oryza sativa L..

Usually, breeders create rice varieties by making crosses among plants within the same species, that is glaberrima x glaberrima or sativa x sativa plants. Otherwise, crosses between species as is the case between glaberrima x sativa are either incompatible (no progenies are produced) or if progenies are produced, they are sterile. A successful progeny from two related species (in this case glaberrima x sativa) is known as an inter-specific cross or hybrid. It is similar to the production of a mule by using a female horse and a male donkey in animals. It is common knowledge that the mule is sterile. The progenies of the African rice by Asiatic rice were also sterile. To correct the

situation, WARDA scientists used a technique known as "anther culture" to make the progenies fertile. The methods used in creating viable inter-specific hybrids of rice which later got the name "NERICAs " is explained in several WARDA documents (WARDA 1998- Focus Inter-specific; WARDA Research Highlights 1999; WARDA Research Highlights 2000, WARDA and its multi-institution collaborators started a Rice Inter-specific Hybridization Project in the early 1990s. *"That major breakthrough opened up a new era of variety improvement for West and Central African rice. NERICA was the result of successful crossing of indigenous African rice with exotic Asian rice. From its African parent, the new rice derived profuse early growth (which means fewer weeds, and a reduced labor input for women (, and resistance/tolerance to local stresses. From its Asian parent, it inherited greater grain production and retention on the plant*" (WARDA IN BRIEF 2000).

The illustration figure below shows the result of crossing Oryza sativa (left) with an average of 248 grains per panicle head and Oryza glaberrima (right) with an average of 116 grains per panicle giving a progeny (middle) with 443 grains. The progeny is NERICA. More grains per panicle means better productivity as will be evident when the yield potential of NERICAS is discussed later.



Source : WARDA

Figure 3. Comparison of NERICA panicles with that of the parents

All NERICAs are WARDA rice but not all WARDA rice varieties are NERICAs. NERICAs are varieties selected from the inter-specific, (O. glaberrima x O. sativa) crosses. However, there are other WARDA varieties which are intra-specific, that is selected from O. sativa x O. sativa crosses.

The NERICAs look more like their sativa parent because more sativa blood is put into them while retaining good traits from glaberrima. This is done by a breeding technique known as backcrossing to the sativa parent several times.

Figure 4. A girl holding NERICA in her right hand and glaberrima panicles in her left.

The NERICA varieties produced and selected so far are rain-fed upland type. They are also well adapted to well drained wet lowlands. WARDA has now a program to produce NERICAs for water-logged lowland and irrigated areas.

Rice is a self-pollinated crop. Therefore, farmers can keep and always use their own seed from year to year. They only have to be careful in order to avoid mechanical mixing of different varieties and also guard them from rodent and insect damages. There is no problem for NERICA farmers if they want to use their own seed .

NERICA rice is one produced through conventional crossbreeding and is not genetically modified rice.

Finally, to avoid any naming confusion the Guinea selected NERICAs are here presented with their original WARDA selection identification (WARDA Res. Highlights 2000).

NERICA 1 = WAB 450-I-B-P-38-HB

NERICA 2 = WAB 450-11-1-P31-1-HB

NERICA 3 = WAB 450-I-B-P-28-HB

NERICA 4 = WAB 450-I-B-P-91-HB

NERICA 6 = WAB-I-B-P-160-HB

IV. THE GUINE NERICA SUCCESS STORY : HOW DID IT HAPPEN?

WARDA in collaboration with the SPAAR program of the World Bank introduced the inter-specific lines (NERICAs) along with few sativa checks (a total of 25 entries) for adaptive testing into Guinea in 1997. These were planted in a multi-location testing of 100 to 200 meter square plots. At that time, Guinea had improved rain-fed upland varieties (CK5, CK7, etc.) and also rain-fed upland to lowland varieties (Kaolak, Sanbankonko, Suakoko, etc.) which were released and in use by farmers. Guinean farmers also keep their own varieties and give them local names.

During 1997-1998,The NERICAs were tested side by side with improved and local varieties in research/extension supervised plots grown in farmers' fields called Unites Experimentales Paysannes (UEPs) and in farmer managed - researcher supervised plots known as Participatory Variety Selection (PVS)plots in which scientists, extension workers and farmers worked as a team in the evaluation of the new lines. At the same time a selection of 100 elite lines from WARDA were planted and evaluated at three Research Stations. The novel approach was designed to familiarize the NERICAs to Guinean farmers gradually and to test their performance. *"In the first year of introduction, farmers were made to evaluate the different lines in small plots named as UEPs supervised by research and extension and managed by farmers. In the following year, farmers received some seed from the ones they selected and grew them in their farms under their own production system with visits and supervision from NARES scientists and extension staff. In the third year, the farmers grew the best varieties they selected in large plots in their farms. By this time the farmers had a good idea of the relative value of the new varieties and had already made their own decisions as to which ones to adopt."*

It is this PVS method of selection and the UEP method of testing and variety selection that already existed and was practiced by IRAG and SNPRV coupled with yield trials at the research level that according to WARDA staff phrasing created the "Spark" followed by a large " Flame " (The Flame Spreads, 2000, Beyond the Flame2001, WARDA in Brief 2000) for the rapid adoption, production and use of the NERICAs in Guinea . Some of the results that convinced researchers, extension staff and particularly farmers are presented in Tables 1-3.

Table 1. Example of Farmer Participation in Variety Selection - 60 Farmers (30 male:30 female), two visits - in Variety Selection at Guekedou in 1997. (Billo and Aly 1999)

Variety	NERICA ID*	Males	Females	Total
WAB450 IBP 160 HB	6	17	6	23
WAB450 IBP 91	4	0	2	2
WAB450 IBP 11-1-1 P31 HB	2	7	1	8
WAB450 IBP 28 HB	3	4	1	5
WAB 450 IBP 38 HB	1	14	13	27

The data in Table 1. presents very interesting results. Firstly, NERICAs 1 and 6 are highly selected by both men and women in the Forest Guinea. Secondly, NERICAs 2 and 3 were selected by men but rejected by women. Therefore, while the criteria of selection (good weed competition, plant height at maturity, large grain, good yield etc.) are usually common but also seem to vary for some particular traits among the two sexes. Finally, it is worth noting that the varieties of NERICA not selected in Forest Guinea have been selected in the other ecological zones (Guinea Savanah, Middle Guinea and Guinea Maritime. For example, NERICAs 2 and 4 are quite popular in the Fouta Djallon (Middle Guinea) because of their tolerance to soil acidity.

During 1997 and 1998, availability of seed of the NERICAs was limited. Hence, there was no UEP testing of all the NERICAs in all the four ecological zones (See Table 2.).

Two conclusions can be drawn from the data shown in Table 2. First, the NERICAs yielded as good or better than the selected sativas and best checks. Second, the NERICAs behaved in the same manner as the selected sativas and best checks by yielding higher with fertilizer than without – an indication that the NERICAs produce their best under better management conditions. That also means that farmers can produce enough rice in smaller areas through intensification and save much forest area form being slashed and burned (possible environmental contribution of the NERICAs).

Table 2. Performance of Some of the NERICAs in UEP Testing During 1997 and 1998. Yield in Kgs/Ha

NERICA	Forest Guinea		Guinea Savanah		Coastal Guinea		Middle Guinea	
	F0*	F+	F0	F+	F0	F+	F0	F+
3	1863	2387						
4	1566	1971	1678	2074			744	1349
6					1385	1596	1205	1761
Selected Sativas**								
IAC 164					2390	2480	1442	1785
BBB8HB			1750	2033				
Best Checks								
CB111			1984	2221			735	1220
SB***					1148	1433		
Can762069 P11							1377	1671

*** F0 = without fertilizer F+ = with fertilizer ** Sativas from WARDA that are well adapted and high yielding in Guinea. *** Samban Konkon – v. good Guinean variety**

Table 3. NERICA Yield Results at Bordo, Seredou and Kilisi Research Centers During During in 19997 and 1998 (Billo and Aly 1999).

Variety	Yield (Kgs/ha) at 3 Centers of Research			2 yrs Ave. Yield
	Bordo	Seredou	Kilisi	
WAB 189 BBB 8 HB	3825	2979	1722	2839
IAC 164	4121	2514	2122	2919
WAB450 IBP 91HB*	4123	3571	1723	3139
WAB450 IBP 160 HB**	3218	3159	2267	2881
WAB450 1BP 28 HB***	3553	3571	1512	2878
WAB450 11-1-1P31-HB****	3904	2094	1615	2538
WAB 24-3-2-P-18-HB	3948	2243	1973	2721
WAB450 IBP 20 HB	3425	1995	1308	2243
WAB 33-25	4340	2805	1828	2991
WAB 181-18	4034	2862	1782	2892
Check Variety 1	4151	1792	1888	2610
Check Variety 2	4194	1963	1952	2703

*** NERICA 4; ** NERICA 6, *** NERICA 3, **** NERICA 2**

Following the many good results obtained both at Research Centers and with farmers, it was found necessary to support farmers with reasonably good seed. Hence a Community-Based Seed Production System (CBSS) was put in place. It is an alternative to the conventional seed system and uses farmers practices and indigenous knowledge to supply seed to small-scale farmers. In CBSS, the national seed service provides certified foundation seeds to several informal seed – growers. Non-certified seeds of acceptable quality are then produced by these growers and distributed for multiplication at the community level. Farmers in the community receive these seeds within 4 years of the release of the variety (WARDA 2000, The flame Spreads beyond 2000; WARDA 2002, Beyond the Flame (in half the time required in conventional variety release).

The UEP method of testing which existed in Guinea before the arrival of the NERICAs and the PVS and CBSS approaches introduced with the NERICAs were strictly followed in Guinea. Guinea bought from WARDA 400kgs of seed in 1997 and 1,500 kgs in 1998. In 1999, third year after the first introduction of the NERICA lines, Guinean farmers had selected and adopted five varieties of NERICA (NERICAs 1, 2, 3, 4 and 6) and were growing them in 120 hectares (Beye et al 1999?). In 2000, exactly on the fourth year, the area under NERICA varieties had grown to more than 8,000 hectares. Here, it is important to briefly cite the voluminous multi-location testing, farmer evaluation field days and evaluation missions by donors that took place in Guinea and the various relentless efforts that took place for the success of the NERICA in Guinea.:

1996 : Guinean NARES officials visit WARDA

1997 : 10 Researchers and Extension staff trained at WARDA and made selections of NERICA lines to be tested in Guinea. In the same year Dr. Monty P. Jones and Mr. Simon Mande conducted a second training for six researchers and 24 extension staff at Seredou, Macenta (Bayo and Conde 2000).

1997: UEP testing conducted in 8 out of 33 districts of Guinea with 116 participating farmers.

1997/98 : 25 NERICA lines + 5 Guinean checks receive PVS testing.

1997/1998 : 12 WARDA + 3 selected Guinean checks tested at Bordo Kilisi and Serredou Research Stations in a Randomized Complete Block Design, 4 Replications.

1998 : In 1998 the UEP testing accomplished in 16 districts with 240 UEPs. More than 2000 farmers were reached by the Participative Variety Selection (PVS)process. SG2000 contributed US$3,000.00 to NARES for PVS.

- **Financial Support for IRAG and SNPRV for the 1997 and 1998 UEP and PVS activities came from the Participatory Rice Improvement and Gender/User Analysis (PRIGA) and PNSA Project of the World Bank (WARDA 2002, Beyond the Flame) .**

- **Mr. Christopher Dowswell and Dr. Tareke Berhe visited WARDA (June 20-21,1998) to promote collaboration between SAA/SG2000 and WARDA .**

As a result of the parallel in-station and off-station testing during 1997 and 1998 in which 39 inter-specific lines and 304 others were tested (WARDA 1998) the following WARDA rice lines (inter-specific and non-inter-specific) were selected in the different ecological zones of the Country.

- **Forest Guinea : WAB 450 IBP 91 HB ; WAB 450 IBP 28 HB ;**
- **Guinea Savanah : WAB 189 BBB 8 HB ; WAB 450 IBP 91 HB ;**
- **Coastal Guinea ; WAB 56 125 ; WAB 450 IBP 160 HB ;**
- **Middle Guinea : WAB 450 IBP 160 ; WAB 450 IBP 91 HB ; IAC 164**

1999 :

- **Dr. Mouctar Toure (SPAAR, WB), Mr. Christopher Dowswell (SAA, Mexico) and Dr. Tareke Berhe (SG2000/Guinea) make a Nzerekore-Conakry NERICA Evaluation Mission.**
- **SNPRV and SG2000/Guinea support NERICA Seed Production under irrigation during the dry season (January March) and together finance a total of 1,000 quarter hectare Production Test Plots (PTPs) –full technology package demonstration plots) and 500 hectares of seed on farmers fields.**

2000 : WARDA Scientists headed by Deputy Director for Research visit Guinea and receive audience by the Head of State and Minister of Agriculture – discussed developments with NERICA.

2000: an SAA/NIPPON Foundation Mission led by Dr. Norman E. Borlaug, President, SAA visit Guinea and return with positive impressions on the NERICAs (important for SAA's continued support for the NERICA program).

2000-2003: SG2000/Guinea Agricultural Project supports National Extension to promote NERICA seeds by financing the production and distribution and demonstration of quarter- to half-half hectare PTPs. SG2000/Guinea also assigned a 4x4 Nissan Pick-up to Mr. Aly Conde, NERICA Coordinator.

During 1998-2003, SG2000's contribution to the NERICA program is estimated at over US$200,000.

2001-2002 : A Guinean Mission (including SG2000 Country Director) led by the Deputy Minister of Agriculture and Livestock attended and presented the Guinean program at the NERICA Workshop in Bouake (2001) and the Commissioning of the African Rice Initiative at Yamousoukouro in 2002.

2001-2003 : IFAD finances PADs at US$20,000/year.

2002-2003 : Community-Based Seed Production System starts with financing by the Japanese Government through UNDP in the amount of US$425,000.00. In 2002, the CBSS Project covered 20 districts out of the 33 in the Country : 5 in Coastal Guinea, 4 in Middle Guinea , 6 in Upper Guinea and 5 in Forest Guinea. (MAE/SNPRV, 2002).

The objectives of the CBSS system of seed production are (1) to improve the availability of low – cost quality seed at the community level and (2) to strengthen farmers' capacities in seed production and distribution. CBSS works in close partnership with other actors whose roles are described in Table 4.

Table 4. List of Partners and their respective roles

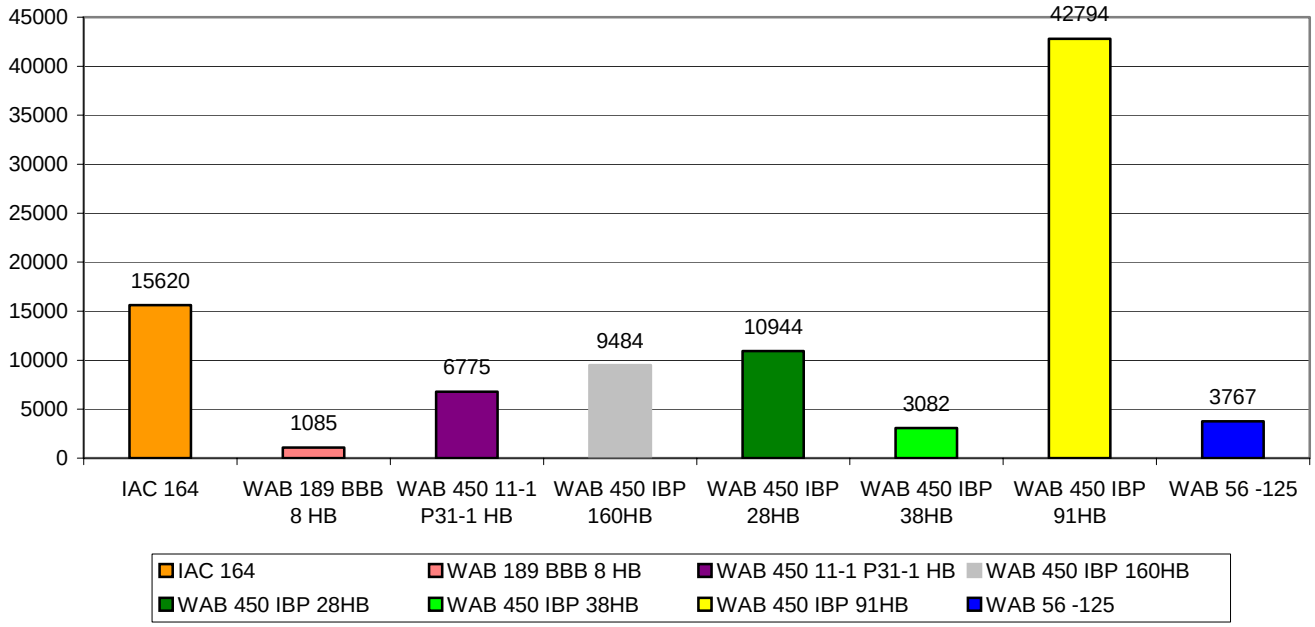
Partners	Collaboration role
OPA	Seeds production and diffusion
ADRAO	Monitoring and evaluation
BURISEM	Training
SG2000	Input supply
SNPRV (Regional offices)	Training and internal monitoring
ENAE	Basic seeds production
IRAG (Research center)	Breeder seeds production
Secteur privé (FuturAgri, E.P.A)	Production and environmental protection
SARA	Training
APEK	Training
DNA	Control and certification

In 2002, more than 93.5 tons of seed was produced by the CBSS project in Guinea. The details of areas of production and quantities of seed produced in 2002 are shown in Table 7 by Region and Figure --- by variety. SG2000/Guinea also produced and distributed over 8 tons. It means that over 100 metric tons of seed was produced in 2002 by the formal sector. Certainly, there was a lot more seed produced by the informal sector.

Table 5: Distribution of basic seeds production by Region and by Variety (agricultural season 2002).

Regions	Prefectures	Farmers Group (Number)	Farm Leaders (Number)	Area (ha)	Used varieties	Production (kg)
				4,0	WAB 450 IBP 28 HB	4622
				2,0	WAB 450 IBP 91 HB	3164
				2,0	WAB 56-125	3000
Kindia	Kindia	2	4	3,3	WAB 450 IBP 38 HB	3 082
	Sub total	2	4	11,3		13 868
					WAB 450 IBP 160 HB	
Mamou	Mamou	1		1	WAB 56-125	1 150
	Sub total	1	0	1		1 150
	Labé	1	3	4,5	WAB 450 IBP 91 HB	9 670
Labé	Lelouma	1	3	4,28	IAC 164	11 120
					WAB 450 IBP 91 HB	1 360
	Mali	1	4	6,0	IAC 164	8 000
	Sub total	3	10	14,78		30 150
	Faranah	1	3	0,5	WAB 450 IBP 91 HB	1 200
Faranah				1,0	WAB 450 IBP 28 HB	3 400
				0,5	WAB 450 IBP 160 HB	1 000
				0,5	WAB 189 BBB 8 HB	1 085
	Dabola	1	3	2,5	WAB 450 IBP 160 HB	2 271
	Kissidougou	2	2	3	WAB 450 IBP 160 HB	930
	Sub total	4	8	8		9 886
	Kankan		3	2,5	WAB 450 IBP 28 HB	1 912
	Kérouané		1	1,5	WAB 450 IBP 28 HB	510
Kankan	Mandiana	1	1	1,5	WAB 450 IBP 160 HB	4 900
	Kouroussa		1	0,5	WAB 450 IBP 28 HB	200
	Siguiri		1	0,5	WAB 450 IBP 28 HB	50
	Sub total	1	7	6,5		7 572
Macenta	Macenta	1	2	2	WAB 450 IBP 91 HB	6 270
	Guéckédou	1	2	2	WAB 450 IBP 28 HB	250
	Sub total	2	4	4		6 520
N'Zérékoré	N'Zérékoré	1	3	5,5	WAB 450 IBP 91 HB	9 600
					WAB 450 11-1 P31-1 HB	6 775
	Yomou	2		3	WAB 450 IBP 91 HB	8 030
	Sub total	3	3	8,5		24 405
Sum total		16	36	54,08		93 551

Figure 5: PRODUCTION PER VARIETY (in Kg)



Out of used varieties there are 5 NERICAs : WAB 450 IBP 160 HB (NERICA 6), WAB 450 IBP 28 HB (NERICA 3), WAB 450 IBP 91 HB (NERICA 4), WAB 450 IBP 38 HB (NERICA 1), WAB 450 11-1 P31-1 HB (NERICA 2),

And 2 originating from Sativa : IAC 164, WAB 189 BBB 8 HB, WAB 56-125.

Seeds were produced by farm leaders and farmer groups. Although they were assisted by the project on a contract and credit basis, they are obliged to pay back the credit in kind and sell back some quantities to the project if necessary. However, if the project does not express any demand till the end of February they are free to dispose of their product.

Table 6. Evaluation of elite lines, CBSS 2002

Varieties	NERICA ID	G1* production (kg)	Yield (kg per ha)	% local standard
WAB 450 IBP 28 HB	3	20,0	1912	188,57
WAB 450 IBP 38 HB	1	31,5	3174	313,11
WAB 450 IBP 91 HB	4	28,0	2779	274,07
WAB 450 IBP160 HB	6	26,0	2099	207,07
WAB 450 IBP 138		17,5	1413	139,38
WAB 56 – 125		18,0	1490	147,01
Samban Konkon(Check)		12,4	1014	100,00
TOTAL		**153,4**	**-**	**-**
Local check			**1014**	
General average			**1983**	**-**
NERICA average			**2491**	**-**

* G1 = Generation 1

The data presented in Table 6 shows that the local check yield is one ton/ha as compared to the average yield of the NERICAs which is 2.5 t/ha. NERICA 2 (WAB 450 IBP 38 HB) gave the highest yield of 3.2 t/ha, followed by NERICA 4 (WAB 450 IBP 91 HB) with a yield of 2.8 t/ha. Compared to the local standard, Samban Konkonon, the NERICAs yielded twice or three times higher. In addition, vegetative cycle is 90 to 92 days for the NERICAs and 141 days for the local variety. Although NERICA 2 (WAB 450 IBP 38 HB) has the highest yield at 3.2 t/ha it is less preferred by farmers because it is aromatic and hence is attacked more animals (rodents) and birds.

Program of off season basic seeds production

Off season basic season production for NERICAs is conducted in prefectures where irrigation facilities do exist such as: Kerouane, Macenta, Gueckedou, Kindia, Coyah, Labe and Lola. Off season production will be from December 2002 to April 2003. Off season of 36 ha is intended to increase 2003 seeds stock for eventual future demand.

Table 7 shows the quantity of inputs distributed to producers to support off season basic seeds production

Table 7: Inputs distribution for off season basic seeds production

Prefectures	Area (ha)	INPUTS			
		NPK (kg)	Urea (kg)	Herbicide (litres)	Seeds (kg)
Kérouané	5	750	500	25	300
Macenta	6	900	600	30	360
Faranah	3	450	300	15	180
Guéckédou	3,5	525	350	17,5	210
Kindia	6	900	600	30	360
Coyah	2,5	375	250	12,5	150
Mamou	1	150	100	5	60
Labé	2	300	200	10	120
Lola	7	1050	700	35	420
Total	**36**	**5400**	**3600**	**180**	**2160**

Recommended fertilizer use per ha is : NPK (150 kg) ; Urea (100 kg); herbicide (5 l). Input use is high but one can remember for basic seeds production it is better to use intensive technology to get better seeds with more advanced farmers. Small scale farmers receive these seeds to produce Seeds of Acceptable Quality (SAQ).

2002 : (August) JICA/SAA Mission visited NERICA activities in Guinea and left with positive impressions.

Figure 6. Photos showing different fields visited by the JICA/SAA Mission. Mr. Kyuya Komatsu (top left), Japanese Ambassador to Guinea did join the field visit.

2002 : (September) UNDP financed International Press coverage of NERICA activities in Guinea including an interview with the Head of state, President Lansana Conte. The visit was organized by UNDP New York representatives, Dr. Ken Fujimura and Dr. Nicholas Gouade and UNDP/Guinea. The honorable Minister of Agriculture and Livestock led the NERICA Field Visit in Faranah.

Figure 7. Photos showing International Press and Minister of Agric. visiting a NERICA Field plus interviews with a NERICA farmer and the Head of State, President General Lansana Conte

2002 : (August-September) ROCARIZ staff visit and another visit by CBSS Seed Production Expert, Dr. Ahmadou Beye during October 14-25, 2002 .

2003 : Japanese Embassy to Guinea, CBSS Project/SNPRV and SG2000/Guinea Agricultural Project initiate a Pilot Project in NERICA Rice Based Cottage Industry in the Region of Faranah. SG2000 invites experts from IITA, Nigeria and SAA, Ethiopia and organizes 2nd Post Harvest Machines Manufacturers' Training at SOMATA, Kindia.

V. RAPID SEED MULTIPLICATION AND DIFUSION

After the identification of NERICAs with good performance SNPRV and SG2000 proceeded with a rapid Community Based Seed Production System and promotion of the new varieties using quarter to half hectare demonstration plots. Quantities of seed produced during 1999-2002 are shown in Table7. The seeds were produced both in the main season with the rains and during the dry seasons under irrigation. A full package of inputs are used for production of the seed. An example is presented in Table 8. as to the types and quantities used .

Table 8. Seed Production and Distribution by SNPRV and SG2000 During 1999-2002

YEAR	SPONSOR	SEED DISTRI-BUTED (TONS)	AREA PLANTED (HA)	SEED PROD. (TONS)
1999	SG2000	10	165	463
	SNPRV	60	1,000	2,000
2000	SNPRV	480	8,000	16,000
	SG2000	15	250	500
2001	SG2000	17	233	566
	SNPRV (PRIGA)	1	11	18
2002	SNPRV (CBSS)	28	43	86
	SG2000	8	134	268
	SG2000	***50***	***782***	***1,798***
	TOTALS	***619***	***9,836***	***19,901***
	SNPRV	***569***	***9,054***	***18,103***

The decreasing trends of seed production after 2000 for SNPRV and 2001 for SG2000 are due to discontinuation of WB support for the former and reduced budgets for the latter.

Table 9. Inputs Distributed for Basic Seed Production, Dry Season 2002.

Prefectures	**Area (ha)**	**INPUTS**			
		NPK (kg)	**Urea (kg)**	**Herbicide (litres)**	**Seeds (kg)**
Kérouané	**5**	**750**	**500**	**25**	**300**
Macenta	**6**	**900**	**600**	**30**	**360**
Faranah	**3**	**450**	**300**	**15**	**180**
Guéckédou	**3,5**	**525**	**350**	**17,5**	**210**
Kindia	**6**	**900**	**600**	**30**	**360**
Coyah	**2,5**	**375**	**250**	**12,5**	**150**
Mamou	**1**	**150**	**100**	**5**	**60**
Labé	**2**	**300**	**200**	**10**	**120**
Lola	**7**	**1050**	**700**	**35**	**420**
Total	**36**	**5400**	**3600**	**180**	**2160**

Not only did Guinea produced and distribute seed within the Country but also met some requests that came from other Countries. The total export of NERICA seed between 2000 and 2003 amounted to near 15 metric tons. Uganda was the first country to benefit. The NERICA program in Uganda has moved very fast. Over 130 tons of certified sedd of NERICA 4 was produced by end of 2002. NERICA 4 has been released in Uganda as Suparica 2. Another country where NERICA production is doing extremely well is The Gambia as indicated by the purchase of 10 tons of seed from Guinea in May2003.

VI. WHAT IS GOOD ABOUT THE NERICAs?

The positive traits of the NERICAs are detailed in many of WARDA's publications among which are : (WARDA 2001 : Spread of NERICAs in Guinea; Defoer et al 2002; Lancon and Ernstein 2002;
Here, those identified by Guinean farmers as good advantages will be listed (Billo and Conde 1999; Bayo and Conde 2000; WARDA 2002 –Beyond the Flame; Camara 2002; Berhe 1999; MAE/SNPRV 2002

1. **Yield/productivity is usually one of the most important criteria. The NERICAs tiller well and have large panicles.**

   The following figures are quite self evident in showing as to how the farmers are very happy and satisfied.

Figure 8. Photos showing happy farmers.

Figure 9. NERICA fields in the acid soils of Fouta Djallon in 2001 (L) and 2002 (R) The NERICAs produce good yields even in the very poor acidic soils of the Fouta Djallon , an area which was considered unsuitable for rice.

2. Early maturity – this is considered a great advantage for several reasons, the first being the possibility of having food at a very critical time during August and September, a time considered as " Hunger Period." Early harvest also enables farmers to sell their extra rice at a higher price. With an extra income they are able to pay for school and buy school supplies for their kids.

In areas of 6-8month rainfall, it is possible to have two harvests of NERICA or a harvest of NERICA plus a second harvest of an early maturing legume such as cowpeas or soybeans.

Figure 10. Earliness in the NERICAs means availability of food at a very critical time, the "Hunger Period " (August-September)

3. **Quick early growth and profuse tillering – the NERICAs compete well with Weeds. One less weeding translates into time and labor saving. This is particularly important since most of the weeding is done by women.**

Figure 11. Photos showing an early vigorous growth of the NERICAs

4. **Drought and pest tolerance – the NERICAs can survive up to 4 weeks without rain and recover well after the continuation of rains. This has been witnessed not only in Guinea but also in Uganda and Ethiopia. Other varieties usually die under the same stress conditions.**

5. **Panicle height is quite convenient for harvesting – many farmers especially in the Guinea Forest Zone harvest by pulling individual panicles. They appreciate a panicle height of about 100cms.**

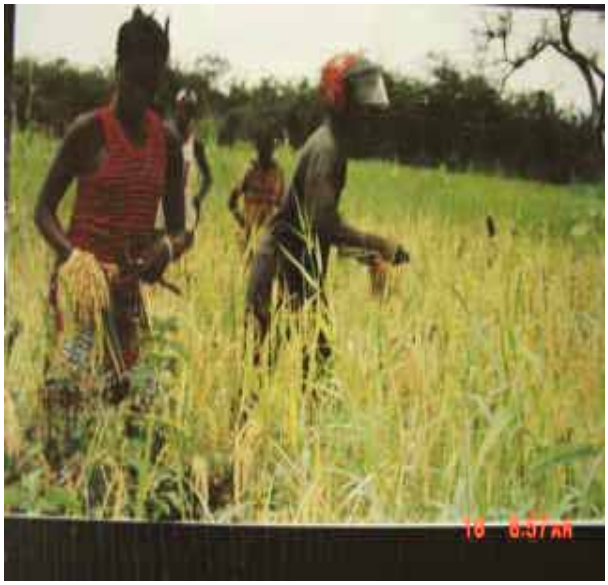



Figure 12. Happy farmers harvesting NERICA fields without having to bend down

6. **Resistant to lodging and shattering**

7. **Acceptable seed size :**

    a. **Farmers target large seeded varieties for the market-sale is based on volume**
    b. **While small seeded varieties are selected for family consumption – more food for the family.**

8. **NERICAs are sweet, have attractive color and some are aromatic (NERICA 1). Aroma is a desirable culinary characteristic.**

    Other negative traits indicated by farmers include : bird damage due to early maturity, threshing difficulty with some varieties and that the aromatic types attract birds, rodents and wild animals.

VII. YIELD POTENTIAL OF THE NERICAS

In Guinea, the NERICAs have been tested by Researchers in Experiment Stations, by Rural Development and Extension Workers working with participating farmers and in Demonstration and Production Plots by SG2000 and SNPRV. Plot sizes varied from 5-10 meter squares at the experiment stations to 100-200 meter squares at the Unite Experimentale paysanne to 0.25-0.50ha in the demonstration plots and 0.5-1.0ha in the production plots. The yield range reported below is a result from many experiments, hundreds of UEPs and PVSes and thousands of demonstration plots carried out during 1997-2002. Experience has shown that potential yield of the NERICAs depends on several factors: namely, the variety, the initial fertility of the soil, length of fallow, fertilizer dose and level of management (cultural practice). The following Table summarizes the Guinea experience in terms of assessing the yield potential of the NERICAs based on fertilizer levels practiced in the Country. The most common fertilizers used are a combination of Triple 17 (17% N-17% P-17%K) and Urea (46% N). The low fertilizer level shown in the Table represents one 50kg sack of Triple 17 and a one 50kg sack of urea while the second level represents two sacks of Triple

Table 10. Yield potential (t/h) of the NERICAs Grown in Guinea (1997-2003)

FERTILIZER IN 50KG SACKS		ELEMENTAL FERTILIZER			AVE. YIELDS T/HA
Triple 17*	Urea **	N	P	K	
0	0	0	0	0	1.0 – 2.0
1	1	30	8	8	2.0 - 3.0
2	1	40	17	17	3.0 - 4.0
3	2	71	25	25	4.0 - 5.0

Table 2. 17N-17P-17K , ** 46%N. * Under optimal conditions an additional 0.5-1.0t/ha can be obtained**

The experience with SG2000's 0.25-0.5 hectare demonstrations in farmers fields is shown in Table 10.

Table 11. Results of Upland Rice Demonstration Plots Sponsored by SG2000

Year*	No. of Farms/Plots	Yield Range	Ave. Yield in T/ha**
1997-1999	1,671	1.3-3.5	2.3
2000	584	1.8-5.0	3.0
2001	1,184	1.7-5.3	3.2
2002	1,902	1.5-4.5	2.8
2003	2,457	1.8-4.8	2.7

*** 1997-1999, best Guinean upland varieties; NERICAs were used during 2000-2002.**
**** National average yields for upland rice are in the range of 0.8-1.0 ton/hectare**

Numerous experiments have shown that the NERICAs have respond well to increasing doses of fertilizer. Yields up to six tons/ha have been obtained. Guinean soils are generally low in organic matter and available nitrogen. They are also acidic in nature, sandy, gravely with low cation exchange capacity. That is to say, they are quite degraded and require soil amendments (corrections) and fertilizer applications in order to raise their productivity.

Figure 13. NERICA 3 with and without fertilizer at Dabola, Faranah, in 2002

To reduce dependence and cost of commercial fertilizers, Guinea is promoting the use of legumes such as cowpeas, soybeans and mucuna (Velvet Bean) in combination with Phosphate Rocks from Mali and Senegal.

When the right technologies and correct crop management practices are used, the NERICAs can bring a marginal return of 1.5-3.01 (average 2.5) (Diallo 2002).

Figure 14. Cowpeas, Soybeans and Mucuna (Velvet Bean) are under test in rotation with the NERICAS to reduce dependence on chemical fertilizers.

VI. NUTRITIONAL QUALITY OF THE NERICAs

Many of WARDA's documents state that the NERICAs have a higher protein content than either of the sativa or glaberrima parents. However, no analytical data which is specific by variety has been published. SG2000/Guinea sent samples of the NERICA varieties along with those varieties from Guinea and also some samples from imported rice varieties to the University of Arkansas, USA for protein and amino acid analysis..

Protein and amino percentage values of three of the most important essential amino acids are shown in Table 2. These results are averages fro samples sent in 2002 (2001 harvest) and 2003 (2002 harvest).

The results show that most of the NERICA varieties and Guinean varieties have a higher protein content as compared to imported varieties and the reported international standard. The analysis also showed that parboiled samples had higher protein and amino acid contents when compared to polished ones.

Table 12. Protein and amino acid content* of the NERICAs grown in Guinea**

NERICA #	PREPAR-ATION	% PRORTEIN	% LYSINE	% TRYPTO-PHAN	% METHIO-NINE
1	Polished Parboiled	10.68 10.70	0.35 0.40	0.08 0.10	0.36 0.36
2	Polished Parboiled	13.25 13.64	0.34 0.35	0.08 0.11	0.38 0.41
3	Polished Parboiled	9.95 10.10	0.35 0.40	0.09 0.10	0.34 0.36
4	Polished Parboiled	8.33 9.41	0.26 0.31	0.06 0.10	0.29 0.034
6	Polished Parboiled	8.7 9.6	0.33 0.36	0.09 0.10	0.32 0.44
IAC164***	Polished Parboiled	11.0 12.3	0.34 0.40	0.09 0.11	0.33 0.36
GUINEAN VARIETIES					
CK 4	Polished Parboiled	9.30 9.52	0.36 0.38	0.09 0.09	0.22 0.26
CK 21	Polished Parboiled	9.3 10.6	0.35 0.38	0.10 0.11	0.23 0.26
CK 73	Polished Parboiled	8.93 9.53	0.35 0.38	0.10 0.10	0.28 0.29
Mangroove rice	Polished	9.90	0.30	0.09	0.43
STANDARD****	Polished	8.1	0.36	0.12	0.24
IMPORTED RICE					
Taiwan	Polished	7.58	0.34	0.08	0.38
China	Polished	7.94	0.33	0.07	0.37

* Analysis made at the Poultry Science Department, Univ. of Arkansas, USA
** Average of 2002 and 2003 analysis

*** Sativa Variety

**** USDA

IX. WOMEN, NERICA PRODUCTION, POST HARVEST AND AGRO-PROCESSING

Guinean women have welcomed the arrival of the NERICAs and have adopted them full heartedly because now they can have food for their family at a critical period, they spend less time on weeding and can get some extra production that they can sell at good price. Cash obtained then can be used to buy clothes and school supplies for children.

Figure 15. Guinean women are full participants in NERICA Rice production

It should be noted though that post harvest and agro-processing technologies are still traditional type and are a great burden to Guinean women. In reality, increased production means more work for the women. The following figures indicate the types of technologies practiced in Guinea.

Figure 16. Loss in quality and quantity occurs in traditional methods: drying and winnowing


Figure 17. Traditional methods consume much effort, time and valuable wood

In 2003, the National Extension and Rural Development Service of the Ministrey of Agriculture and Livestock in partnership with Sasakawa Global 2000 and encouragements from UNDP New York has decided to implement a Pilot Project for establishing a rice –based agro-processing cottage industry. The project is financed by The Japanese Embassy to Guinea and executed by Sasakawa Global 2000. Its objectives are (1) to facilitate access of rural communities to agricultural post-harvest machinery, (2) to improve availability of improved seed and rice grain to rural communities, (3) to promote sale of processed NERICA rice and (4) to reinforce the technical capacity of producers and technicians. The project has a one year duration (May 2003-April 2004).

The Project site is located in the Region of Faranah (Guinea Savanah). Three Farmers Unions most of whose members are women have been selected. 60 hectares are planned to be sown with NERICA seed accompanied by a full package of technologies.

At or after harvest, the three Unions will be equipped with a set of post-harvest machineries each – thresher, par-boiler and de-huller. These machines have been manufactured in Guinea with the collaborative financing and training of experts from IITA, SAA and SG2000/Guinea. Union members will be trained at all levels of production ,processing and marketing. The idea is to demonstrate that the NERICAs can be produced profitably.

In addition to production and processing, the members of the Union will also be assisted to take care of their environment. Hence reforestation, soil fertility management and other environmentally friendly income generating activities will be taught.

Based on the results of the pilot project, for testing a NERICA Rice based cottage industry has been launched in the region of Faranah. The project is to be financed at a cost of US$81,000.00 by the National Extension and Rural Development of Guinea and Sasakawa Global 2000. Some of the post harvest and agro-processing machinery that have been introduced by the project are shown in Figure 14.

Figure 18. Photos showing threshing, de-hulling and packaging demonstrations during a Field Day in 2002

X. PROBLEMS ASSOCIATED WITH NERICA PRODUCTION

The following problems have been reported by NERICA growing Guinean farmers:

- **Birds: NERICAs mature before everything else; prone to bird attack.**
- **Rodents: some of the NERICAs are aromatic and attract rabbits and grass-cutters.**
- **Drying: theNERICAs mature in the middle of the season; drying is difficult in moisture saturated air.**

- **Threshing: some varieties are hard to thresh manually.**
- **Segregation: glaberrima like plants observed in fields of NERICA.**
- **Stem Borer (Shoot Fly): mainly observed in the Fouta Djallon area, Labe.**

XI. CONCLUSIONS

- **Guinea has developed a good Community Based Seed Production program for NERICA rice and has progressed far in the promotion and utilization of the NERICAs. Guinean farmers are cultivating the crop in tens of thousands of hectares. Guinea has also become a source of seed for several Sub-Saharan African Countries.**
- **The good progress in the promotion of NERICA rice in Guinea was as a result of an initial interest and push from the World Bank, WARDA and the Ministry of Agriculture, Republic of Guinea. Later , other partners such as UNDP, IFAD, and SG2000 came in to strengthen the collaborative effort and push the program forward.**
- **The NERICAs are well adapted to Guinea conditions. Farmers are obtaining yields up to 5.0 metric tons per hectare under good management. The high productivity of the NERICAs will allow farmers to slash and burn less forest thus saving the environment for present and future generations**
- **Best performance of NERICAs is with reasonable level of fertilizer application combined with improved cultural practices.**
- **Fertilizer is a must for intensive NERICA production. Without fertilizer use, increased NERICA production will mean destruction of the environment.**
- **The NERICAs grown in Guinea are nutritionally superior – have higher protein and essential amino acid content as compared to imported rice sold in the country. This is very important since Guinea has one of the highest per capita consumption rate.**
- **Guinea has embarked on a NERICA Based Rice Agro-Industry Pilot Project in the Region of Faranah. The Project embraces many very important aspects of development including: agricultural inputs, soil fertility management, resource management, income generation, gender (over 80% of project participants are women), environment, etc. In its first year, the project is progressing well. It is financed by the Guinean Ministry of Agriculture and Sasakawa Global 2000/Guinea. Depending on results, other donors are expected to join in.**

REFERENCES

Bayo. L. and Aly C. 2000.Evaluation des varieties inter-specifiques de riz ADRAO. Evaluation Mission Report. (Unpublished). PASAL/BCEPA and SNPRV, MAE, Conkry, Rep. of Guinea. 19p.

Berhe, T. 1999. WARDA Rice in the Republic of Guinea: A Report Based on Field Visits Conducted During September 5-8, 1999 and the two Preceding Years, 1997 and 1998. SG2000/Guinea, Conakry, Rep. of Guinea.

Beye, A. M., Jones M.P., Simpson B., Barry M. B., and Conde A. Le paysan-principal acteur du programme pilote de transfert de technologies en Guinee. WARDA, Bouake, Cote D'Ivoire. 8p.

Billo, B.M. and Aly C. 1999. Rapport de Synthese sur le programme pilote de transfert de technologies rizicole en Guinnee. Document Provisoire (Unpublished). IRAG/SNPR, MAE., Conakry, Rep. of Guinea. 39p.

Camara, L. 2002. Communication du Paysan Leader, Layba Camara au Sommet du Johannesbourg. 2p.

Defoer, T., M.C.S Whopereis, M.P. Jones, F. Lancon and O. Ernstein. 2002. Challenges, Innovation and Change: Towards Rice-Based Food Security in Sub-Saharan Africa. Article presented at the 20th session of the International Rice Commission, Bangkok 23-25 July 2002. 25p.

Diallo, El Hadj Mody Sidy. 2002. Economic Analysis of PTP Results. SNPRV/SG2000. 18p.

Lancon, F. and O. Ernstein. 2000. Paper presented at the Sub-Regional Workshop on Harmonization of Policies and Co-ordination of Programmes on Rice in the ECOWAS Sub-Region. Accra, Ghana, 25-28 February 2000. 23p.

Jones, M. P and A. Beye . Spread of NERICAs in Guinea : Towards Food Security. The History and Keys of Success. 10p.

MAE, 2002. Memo sur la diffusion des varieties de NERICA en Guinee. Projet de multiplication et de diffusion des nouvelles varietes de riz selectionnees par l'ADRAO. 4p.

MAE/SNPRV 2002. Project CBSS-NERICA/Guinee : Rapport Annuel. Decembre 2002. 24p.

MAE/SNPRV/SG2000-Guinee 2003. Projet Pilote de Transformation Poste Recolte du Riz. Fevrier 2003.

Sagno, O. J, M.S. Monemou and F. Camara. 1999. Les Varietes de Riz Recommandees pour les Systems de Production a Base de Riz Pluvial en Guinee Forestiere : Fiche

Descriptive pour la Vulgarisation. IRAG, Centre de Recherche Agronomique de Seredou, Macenta.

SG2000. 2001. 1996-2000 Five Year Report

SG2000. 2003. 2001-2002 Two Year Report

WARDA. 1996. Bintou and Biodiversity: Unlocking the genetic treasures of African rice species. WARDA, Bouake, Ivory Coast.

WARDA. 1996. Rice Trends in sub-Saharan Africa: a synthesis of statistics on rice production, trade and consumption (1973-1992).

WARDA. 1998. Focus Interspecifics: Africa-Asia Joint Research on Interspecific Hybridization between African and Asian rice Varieties-Highlights of 1998 Activities. WARDA, Bouake , Ivory Coast. 24p.

WARDA. 1999.: Participatory Varietal Selection :The Spark that Lit a Flame, Farmer-scientist symbiosis spreads new African rices. WARDA, Bouake, Ivory Coast. 32p.

WARDA. 1999. Rice Interspecific Hybridization Project: Research Highlights 1999. Africa/Asia Joint Research on Interspecific Hybridization Between African and Asian Rice Species Oryza glaberrima Steud. And Oryza sativa L. WARDA, Bouake, Ivory Coast. 34p.

WARDA. 2000. Participatory Varietal Selection : The Flame Spreads Into 2000. Proceedings of the Participatory Rice Improvement and Gender/User analysis Workshop (PRIGA), 17-21 April 2000. WARDA Headquarters, Bouake, Ivory Coast. 81p.

WARDA. 2000. RICE : Inter-specific Hybridization Project. Research Highlights 2000. Africa/Asia joint research on inter-specific hybridization between African and Asian rice species Oryza glaberrima Steud. And Oryza sativa L., WARDA, Bouake, Ivory Coast. 34p.

WARDA. 2000. WARDA IN BRIEF: Partners in Development responding to the challenges of food security and poverty eradication in Africa. 20p.

WARDA. 2001. Participatory Varietal Selection : Beyond The Flame. Proceedings of the Participatory Rice Improvement and Gender/User Analysis Workshop (PRIGA), 2-5 May 2001. WARDA Headquarters, Bouake, Ivory Coast. 78p.

WARDA, 2001. Spread of the NERICAs in Guinea: Towards Food Security- The History and Keys of Success. WARDA, Bouake, Ivory Coast. 10p.

WARDA. 2002. The African Rice Initiative: Towards Poverty Reduction in Sub-Saharan Africa, A Consortium for a NERICA-Based Food Security in Sub-Saharan

Africa. Proceedings of Launching Ceremony held at Yamousoukouro, Ivory Coast, 26-27 May 2002. WARDA Headquarters, Bouake, Ivory Coast.

WARDA. 2002. The African Rice Initiative (ARI): NERICA Consortium for Food Security in Sub-Saharan Africa. Project Proposal, March 2002. WARDA, Bouake, Ivory Coast. 40p.

World Bank . 1998. Guinea: Speeding up Technology Transfer to rice Growers. Findings. Paper No. 35.

APPENDIX A. FARMER'S APPRECIATION OF NERICA VARIETIES

COMMUNICATION *OF Mr. Leyba Camara, FARMER LEADER AND NERICA SEED PRODUCER IN THE REPUBLIC OF GUINEA, WEST AFRICA

My village, Layadoula is found at 25 kilometeres distance from the Regional Capital, Faranah. The main occupation of the population is agriculture based on rice cultivation.

Rice is our staple food and main source of energy; therefore, 90% of our time is spent on activities related to rice production.

We cultivate two types of rice:

- ***Upland (Rain-fed) rice and***
- ***Plains (Flatlands) rice***

Upland rice occupies the largest area.

MY EXPERIENCE WITH NERICA

In 1991, I was selected by the National Extension Service as one of the WARDA Seed Producers. We received training as to how to produce good seed. After the training, I received 18 kilograms of one variety by the name of WAB 450 IBP 91 HB. I harvested 800 kilograms from the 18 kgs. I sold some of that seed to my fellow villagers and interested institutions in the area.

In 2000, my family planted 150 kilograms of the same variety and harvested 3.2 tons. I sold 2.0 tons as seed and retained 1.2 tons for family use.

Again in 2001, my family planted 150 kilograms and harvested 4.0 tons. This time, we sold 2.0 tons and retained the other two for family consumption.

This year (2002), my family has planted 120 kilograms of WAB 450 IBP 91 HB and 30 kilograms of a second variety, WAB 450 IBP 28 HB.

MY AGRONOMIC EVALUATION OF THE NERICAS

- ***The NERICAS have well filled god quality grains. False or empty grains hardly exist.***

Presented at the World Summit for Sustainable Development, Johannesburg, S. Africa, 2002

- ***The NERICAS have good germination and tillering capacity. They also have large panicles.***

- ***Growth is vigorous and rapid with the NERICAS which allows them to compete better with weeds.***

- ***They are very early (90 days to maturity), are drought resistant and resistant to diseases that attack local varieties.***

- ***NERICA harvest coincides with the critical Hunger Period. This is assures family food at a very critical period.***

ECONOMIC IMPORTANCE OF THE NERICAS

- ***Less time spent on weeding the NERICAS.***

- ***They can be harvested when rice is scarce in the local market and can be sold at a good price thus raising the family income and allowing the purchase of clothes, school supplies for children and agricultural inputs for the next crops.***

- ***Before the arrival of the NERICAS, I used to cultivate four local varieties. Now I retain only two. The harvest is used for family food.***

- ***Immediately, after the harvest of the NERICAS, I plant soybeans, cowpeas or cassava. This practice was unknown before. It is good because it adds to food security.***

MY MESSAGE TO FELLOW FARMERS

- ***I wish that the NERICAS spread and be cultivated all over the World. They can be one of the solutions to the problems of hunger and malnutrition.***

- ***The NERICAS are early, disease resistant and drought tolerant.***

- ***Because of their earliness, the NERICAS allow the planting of a second crop-a practice that was not possible before.***

- ***I hope that soon there will be NERICA varieties for the Plains and Lowlands.***

I put forward my earnest call to all my fellow farmers everywhere to listen closely to the advice of Development Agents and work closely with them so that all of us can succeed and develop.

APPENDIX B. NERICA Seed Export from Guinea to Other Countries, 2000-2003

COUNTRY	YEAR	VARIETIES EXPORTED	QUANTITIES (Kgs)
Ethiopia	2002 2003	NERICAs 1 - 5 " 1 - 5	50 10
Gambia	2002 2003	NERICAs 2, 4, 6 "	115 10,000
Malawi	2001	NERICAs 1, 2, 3, 4	80
Mali	2001 2003	NERICAs 1, 3 " 4 WAB 189 BBB 8 HB	7 1,500 1,500
Nigeria	2001	NERICAs 1, 2, 3, 4	40
Sierra Leone	2002	NERICAs 1, 3	1,500
Uganda	2000	NERICA 4 WAB 189 BBB 8 HB	60 50
TOTAL SEED EXPORTED (2000-2003)			14,912 Kgs (14.912 Tons)

APPENDIX C. SAMPLES OF GUINEAN COUNTRY SIDE

The Guinean beautiful country side which can be used to advantage as attraction for tourism and wild life refuge is disappearing fast due to " Slash and Burn " practice of growing upland rain-fed rice without the use outside inputs. This practice must be made to stop so that the same beauty can be safe-guarded for future generations.

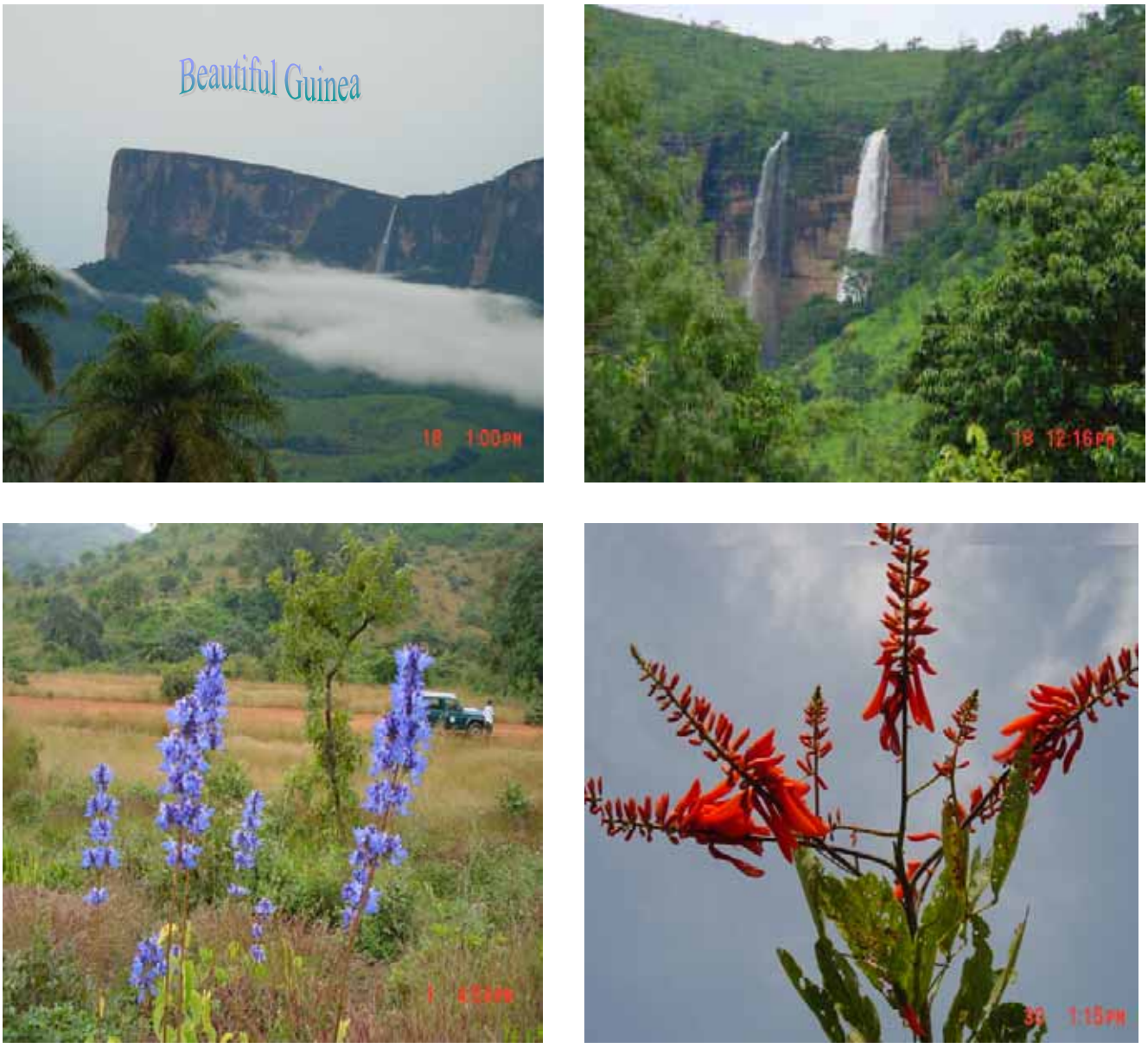


Figure 19. Some of the breathtaking natural beauty and wild flowers found in Guinea.

NERICA : THE GUINEA EXPERIENCE

BY

SEKOU BEAVOGUI – RESEARCH
ALY CONDE – EXTENSION
TAREKE BERHE – SG2000 - NGO

PRESENTATION LAYOUT

- REASONS FOR NERICA SUCCESS IN GUINEA
- WHAT DO WE GAIN FROM NERICA?
- NERICA PILOT PROJECT
- OBSERVED PROBLEMS
- THE WAY FORWARD
- CONCLUDING REMARKS

WHY DID NERICA SUCCEED IN GUINEA

I. REASONS FOR SUCCESS

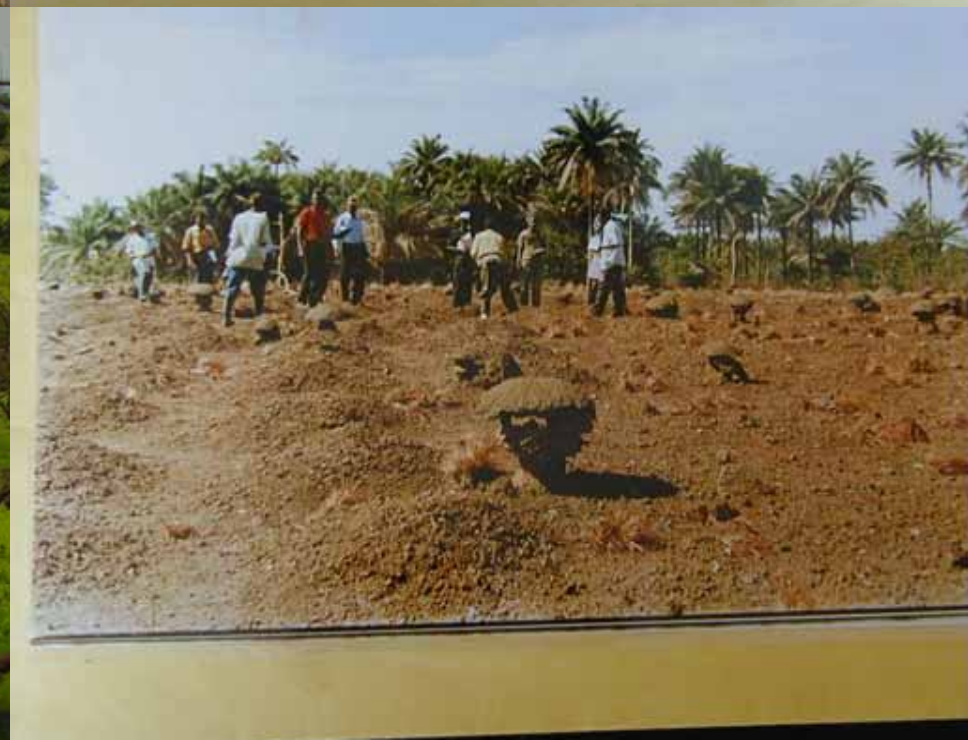
1. RICE IS THE MAIN STAPLE FOOD
2. COLLABORATIVE EFFORT AMONG INSTITUTIONS
3. VARIETAL ADAPTATION AND PERFORMANCE
4. WELL COORDINATED NATIONAL PROGRAM
5. POLITICAL WILL

1. RICE IS MAIN STAPLE FOOD IN GUINEA

- 90-100 KG/PERSON/YEAR = HIGHEST IN WEST AFRICA
- OVER 800,000 MT OF PADDY RICE PRODUCED ANNUALY
- 200,000-300,000 MT RICE GRAIN IMPORTED/ YEAR.
- 65% PRODUCED UNDER RAINFED UPLAND SYSTEM

- QUICK AND CONCERTED ACTION CONSIDERED NECESSARY TO IMPROVE THAT SYSTEM
- NERICA OFFERED A WINDOW OF OPPORTUNITY

RAINFED UPLAND SYSTEM OF RICE PRODUCTION IN GUINEA



2. IT WAS A COLLABORATIVE EFFORT

A. INITIALLY

1. NATIONAL RESEARCH AND EXTENSION
2. THE WORLD BANK
3. WARDA

B. LATER

1. PRODUCERS
2. NGO – SAA/SG2000
3. SOURCE OF FINANCE: JAPANESE GOVT. THROUGH UNDP, IFAD, ADB (Latest)

3. ADAPTED & PRFORMANT VARIETIES

4. WELL COORDINATED NATIONAL PROGRAM

4a. SEED PRODUCTION

MAINTAINANCE OF SEED PURITY OF THE NERICAS AT RESEARCH STATIONS AND AT FARM LEVEL

4b. NERICA SEED EXPORT: 2001-2003 (14.8 TONS)

Country	NERICA VAR.	QTY (Kgs)
Gambia	2, 5 & 6	10,115
Ethiopia	All 7	60
Malawi	1- 4	80
Mali	1, 3 & 4	3,007
Nigeria	1- 4	40
Sierra Leone	1 & 3	1,500
Uganda	4	60

4c. SOIL FERTILITY

COMMERCIAL FERTILIZERS, NATURAL ROCK P AND LEGUMES (MUCUNA SOYBEANS AND COWPEAS) TESTED ALONE AND IN COMBINATIONS

4d. POST HARVEST AND AGRO-PROCESSING ACTIVITIES

- Threshing
- Parboiling
- Polishing

5. POLITICAL WILL

- ✓ HEAD OF STATE RECEIVED WARDA MISSION
- UNDP/NEW YORK MISSION AND INTERNATIONAL PRESS

II. EXPECTED GAINS FROM THE NERICAs

1. INCREASED PRODUCTION

2. INCREASED FAMILY REVENUE

3. IMPROVED FAMILY NUTRITION

4. PROTECTED ENVIRONMENT

= FOOD SECURITY + REDUCTION OF POVERTY

1. Yield potential (t/h) of the NERICAs Grown in Guinea (1997-2003)

FERTILIZER IN 50KG SACKS		ELEMENTAL FERTILIZER			AVE. YIELDS t/ha***
Triple 17*	Urea **	N	P	K	
0	0	0	0	0	1.0 – 2.0
1	1	30	8	8	2.0 - 3.0
2	1	40	17	17	3.0 - 4.0
3	2	71	25	25	4.0 - 5.0

* 17%N-17%P-17%K , ** 46%N. ***If soils are fertile to begin with an additional 0.5-1.0t/ha can be obtained.

2. NUTRITIONAL QUALITY (% PROTEN)

Sample	Polished	Parboiled	
6 NERICAs	10.2	10.7	
4 Guinean Var.	9.4	10.7	
2 Imported Var.	7.7	n.a	
Standard (USDA)	8.1	n.a	

III. NERICA PILOT PROJECT (To Confirm Sustainability)

1. INTENSIFIED PRODUCTION
2. FARM MANAGEMENT
3. RESOURCE MANAGEMENT
4. GENDER
5. FARMER ORGANIZATIONS
6. POST-HARVEST MACHINES
7. ENVIRONMENT

IV. OBSERVED PROBLEMS

1. Birds: NERICAs mature before all else
2. Drying: mature during rainy period
3. Threshing: some hard to thresh manually
4. Aroma: attracts rodents & wild animals
5. Segregation/Mixture?: glaberrima type heads observed.
6. Stalk(stem) borer – shoot fly

V. THE WAY FORWARD

1. Complete and Expand NERICA Based Agro-Industry Pilot Project
2. Carry out ADB Financed ARI Project
3. Increase Collaboration with WARDA plus other Countries and Build Good Data Base
4. Start Testing Paddy (Irrigated) Nerica
5. Devlop and Diffuse Full Package of Nerica Production Technologies
5. Campaign for Formal Seed Production in Guinea

V. CONCLUDING REMARKS - WHEN THINGS ARE DONE RIGHT

NERICA FOOD TASTING AT JAP. AMBASAD. RESIDENCE

GUINEA'S BEAUTIFUL ENVIRONMENT

KILISI FALLS

A WILD FLOWER


BIG THANKS
Small ones too
26 1:13PM


THE END
STOP