F. Round-Table Discussion

Group-A (Western African & Madagascar):

Gambia, Ghana, Guinea, Ivory Coast, Mali, Niger, Nigeria, Senegal, Madagascar

Group-B (Eastern & Southern African):

Ethiopia, Kenya, Malawi, Mozambique, Tanzania, Uganda, Zambia, Zimbabwe

Summary of Round Table Discussion - Group A -

Participants

Cote d'Ivoire:	Mr. Okou ZAGO, Mr. Coulibaly SIAKA MINAYAHA
Gambia:	Mr. Alphou MARONG, Mr. Ibrima KUNJO
Ghana:	Mr. Sammy Mensah AKAGBOR, Mr. Albert Feefi SWATSON, Dr. Narihide NAGAYO
Guinea:	Mr. Aly CONDE, Mr. Sekou BEAVOGUI, Dr. Tareke BERHE
Madagascar:	Ms. Nicole Heri-Sora RAKOTOMALALA, Ms. Georgette RAHARISOA, Mr. Kanji KUNIHIRO
Mali:	Dr. Yacouba DOUMBIA, Mr. Matallah TRAORE
Niger:	Mr. Yacouba SIDO MOHAMED ABDOUL-WAHAB, Mr. Naroua DJIBO
Nigeria:	Dr. Parry Muntari NYANDAITI, Dr. I.O.FATOBA
Senegal:	Mr. M. Bafode DRAME, Dr. Taib DIOUF, Ms. Mayumi ANDO NDIAYE
WARDA:	Dr. Inussa AKINTAYO, Dr. Kouame MIEZAN (ARI)

Record of Discussion:

Round Table Discussion in Group A, chaired by Dr. N. Nagayo, Leader of the JICA funded Small Scale Irrigated Agricultural Promotion Project (SSIAPP) in Ghana, was made at auditorium of AICAD between 1:50 p.m. and 4:45 p.m. on 11th of February, 2004. The total number of participants was 24, coming from Cote d'Ivoir, Gambia, Ghana, Guinea, Madagascar, Mali, Niger, Nigeria and Senegal. Representatives from WARDA and ARI also joined the discussion.

First, Dr. Nagayo explained the participants briefly about the objective and procedure of the discussion. Then, each representative from the participating countries presented the current situation of rice and constraints to and issues on rice development, based on the formatted table they have filled in (refer to the tables).

1. Present Conditions

As for the current situation of rice, the following three common aspects were recognized:

(i) Rice is the very important cereal crops for all countries;
(ii) Self-sufficiency rate of rice is less than 50% in many countries despite of its important position; and
(iii) Rice is produced mostly in rainfed conditions.

As for constraints to the development of rice, the followings were among others important.

(i) Inadequate research in such fields as variety improvement, post-harvest, package of production technologies, socio-economy, etc.;
(ii) Low quality of domestic rice (hence low price) which results in the decrease in competitiveness with

imported rice;

(iii) Lack of credit system for farmers to procure inputs (high cost of inputs);

(iv) Weak farmers' organization;

(v) Inadequate post harvest processing; and

(vi) Lack of marketing channels, are among others important constraints.

Other constraints raised included external assistance not reaching to farmers (Nigeria), uncoordinated research and extension (Niger), and poor funding for rice sector (Cote d'Ivoire, Guinea and Gambia)

2. Issues

While Dr. Nagayo had asked participants to select priority issues to tackle, several countries including Côte d'Ivoire, Gambia, Ghana and Mali insisted that those constraints could not be separated and prioritized as they were related each other, and emphasized that the importance of integrated approaches to remove constraints. Other countries have put priority on specific issues, including assurance of supply of inputs like seeds, fertilizer, etc. (Madagascar, Niger and Nigeria) and strengthening of research (Senegal).

Meanwhile, the representative from WARDA emphasized that both the quality and productivity improvement of rice are necessary for all countries to compete with imported rice through research and technology development as well as the improvement of processing and marketing. He also mentioned that research should be focused on productivity increase and quality improvement, and that extension and training should link scientists, extension workers and farmers.

3. Possible approach

While several countries have found difficulty in competing with cheap imported rice under the globalization process, possible approaches to strengthen the competitiveness of domestic rice marketing included: low cost rice production technologies such as rotational cropping and the use of leguminous crops (Côte d'Ivoire), development of high value rice like aromatic rice (Senegal), supporting private sector to market high quality rice and productivity enhancement (Ghana), encouragement of individual farmers and farmers' groups in better processing (Nigeria) and variety improvement (Guinea).

Other possible approach proposed to enhance productivity and improve quality included development of location specific packages for production technologies under different soil and water conditions (Nigeria), variety improvement based on needs, development of integrated production technologies and commercialization extension (Senegal), and development of new varieties adaptable to lowland and development of palatable rice (Ghana)

4. NERICA

As for issues to promote NERICA, it was found each country was under its own stage of development.

Guinea has advance with regards to NERICA dissemination and already reached certain level of yield. However there exists serious problem of fertilizer shortage. Credit system to procure fertilizer is keenly necessary.

In Gambia, seed dissemination and multiplication system should be formalized, and also it requires a seed bank. In Nigeria, NERICA is still new. Two varieties of NERICA through testing have been officially released in 2003. Further information on varieties is required.

In Mali, shortage of inputs like fertilizer poses serious problem. So far only one variety has been selected. No farmers are organized. There lacks in encouraging system to grow NERICA and in training.

In Cote d'Ivoire, finance in disseminating seeds as a problem. There lacks credit facilities.

In Senegal, still the production is very small.

In Ghana, experiment on variety selection is still going-on.

WARDA stated that NERICA has not been well-known. For future development and promotion of NERICA, it presented three issues: (i) characterization of NERICA, (ii) establishment of seed production and distribution system, and (iii) development of package of NERICA production technology.

Summary of Dr. Nagayo (Chairman of Round Table Discussion :Group A)

Present Conditions (1):

1. Rice is very important cereal crops;
2. Self-sufficiency rate of rice is low in general;
3. Rice is mostly grown under rainfed conditions.

Present Conditions (2):

Country	Self sufficiency rate
Cõte d'Ivoire	48%
Gambia	12%
Ghana	<50%
Guinea	70%
Madagascar	>90%
Mali	92%
Niger	33%
Nigeria	64%
Senegal	18-20%

Constraints to promote rice production and dissemination:

(1) Inadequate research in such fields as variety improvement, post-harvest, package of production technologies, socio-economy, etc.;
(2) Low quality of domestic rice (hence low price) which results in the decrease in competitiveness with imported rice;
(3) Lack of credit system for farmers to procure inputs (high cost of inputs);
(4) Weak farmers' organization;
(5) Inadequate post harvest processing; and
(6) Lack of marketing channels, are among others important constraints.

Issues to Tackle

(1) Integrated approach is necessary as constraints are related each other; and
(2) Quality and productivity improvement are keenly required through research and technology development and improvement of processing and marketing to compete with imported rice.

Issues for promoting NERICA

(1) Establishment of seed bank;
(2) Assurance of inputs (e.g. fertilizer) by credit;
(3) Development of package of production technology;
(4) Characterization of NERICA; and
(5) Establishment of seed production and distribution system.

Agenda of the group discussion

1. The presentation of the present conditions.
2. The summary of the present situation.
3. Discussion to prioritize the issues to tackle.
   1) Research and technology development
   2) Availability of input (seed etc.)
   3) Dissemination / Extension and training
   4) Post harvesting and marketing
   5) Others
4. The summary of the prominent or common points on the issues.
5. Discussion on NERICA to clarify activities, constrains and vision.
6. Discussion on the way forward to promote rice production and dissemination.

Synthesis of Group A:

Countries

- Cote d'Ivoire
- Gambia
- Ghana
- Guinea
- Madagascar
- Mali
- Niger
- Nigeria
- Senegal

Promotion of Rice Production and Dissemination in Africa

Participants

Cote d'Ivoire:	Mr. Okou ZAGO, Mr. Coulibaly SIAKA MINAYAHA;
Gambia:	Mr. Alphou MARONG, Mr. Ibrima KUNJO;
Ghana:	Mr. Sammy Mensah AKAGBOR, Mr. Albert Feefi SWATSON, Dr. Narihide NAGAYO;
Guinea:	Mr. Aly CONDE, Mr. Sekou BEAVOGUI, Mr. Tareke Berhe;
Madagascar:	Ms. Nicole Heri-Sora RAKOTOMALALA, Ms. Geortette RAHARISOA, Mr. Kanji KUNIHIRO;
Mali:	Dr. Yacouba DOUMBIA, Mr. Matallah TRAORE, Dr. Inussa AKINTAYO, Dr. Kouame MIEZAN ;
Niger:	Mr. Yacouba SIDO M. A., Mr. Naroua DJIBO;
Nigeria:	Dr. Parry Muntari NYANDAITI, Dr. I.O.FATOBA;
Senegal:	Mr. M. Bafode DRAME, Dr. Taib DIOUF, Ms. Mayumi ANDO NDIAYE

Present Conditions

- Rice is very important cereal crops.
- Low self-sufficiency rate of rice.
- Rice is mostly grown under rainfed condition.

Present Conditions

Country	Self sufficiency rate (%)	
Côte d'Ivoire	48%	
Gambia	12%	
Ghana	＜50%	
Guinea		
Mali		
Niger	33%	
Nigeria	＜50%	
Senegal	18－20%	

Constraints to promote rice production and dissemination

- Lack of research and technology development (variety improvement, post-harvest, package of production technology, etc.)
- Low competitiveness of domestic rice with imported rice
- Lack of credit system for the farmers.
- Weak farmers' organizations
- Problem of post harvest processing
- Marketing problem

Issues to Tackle

1. Integrated approach is necessary as constraints are interlinked.
2. Quality and productivity improvement are keenly required through research and technology development and improvement of processing and marketing.

To compete with imported rice

Issues for promoting NERICA

Necessity of seed bank

Lack of inputs (e.g. fertilizer) due to lack of credit

Lack of package of production technology

Lack of characterization of NERICA

Lack of seed production and distribution system

Summary of Round Table Discussion - Group B -

Participants

Ethiopia:	Mr. Toshiro MADO, Mr. Shigeo KARIMATA Mr.Ashine SILESHI, Mr. Habte ENDESHAW
Kenya:	Mr. W.O. KOUKO, Mr. R. K. WANJOGU, Mr. J. NOKECH, Mr. Kiyoshi KITA, Dr. Daigo MAKIHARA, Mr. Jiddah CHOKE, Prof. E.M. NJOKA, Dr. C.M. NDIRANGU, Mr. M.K. CHANGWANY, Mr. S.M. MARINA, Mr. S. M. MARINA, Mr. D.N. MWANJILA, Mrs. Mary WABUB, Mr.G. MUGAMBI, Mr. E.A. ATARA, Dr. Eusebius J. MUKHWARA, Mr. Alan W. SITATI, Ms. Anne ONYANGO, Dr. Safdar SOHAIL
Madagascar:	Ms. Nicole Hery-Sora RAKOTOMALALA, Ms. Georgette RAHARISOA, Mr. Kanji KUNIHIRO
Malawi:	Mr. Denis KARIRANGWE, Mr. Koutarou TANAKA, Mr. Vincent MKANDAWIRE, Mr. Kiyonori MATSUSHIMA
Mozambique:	Mr. Carlos Zamdamela, Mr. Jose MAGIA, Mr. Masato TAMURA
Tanzania:	Mr. R. J. SHAYO, Mr. Tamotsu YAMADA, Dr. Ashura LUZI-KIHUPI, Mr. Kenji TAMURA, Dr. Jacob C. MBAPILA, Dr. Moses N.W. MNZAVA, Dr. Jiro NOZAKA
Uganda:	Dr. George BIGIRWA, Mr. Charles RUSOKE, Mr. Motonori TOMITAKA (Presenter)
Zambia:	Mr. Kenji MAEDA
Zimbabwe:	Dr. Shadrack S. MLAMBO
Guinea (SG2000):	Mr. Hareke BERHE

Segment 1

Reporting from participants following the Table for round table discussion.

Prior to the round table discussion, each participating country were requested to submit an additional questionnaire. Participants reported the current conditions and five issues (1. Research and Technology Development, 2. Availability of Input (seed, etc.), 3. Dissemination /Extension and Training, 4. Post-harvest processing and Marketing, and 5. Other Important Issues) of respective countries. The table for reporting is shown in the Appendix.

1. Present Conditions

Rice is important as food crop and cash crop

- Rice ranks 2nd or 3rd important cereal in some countries in E&S Africa.
- Rice consumption is increasing in many countries in E&S Africa.
- Rice is imported by many countries in E&S Africa.
- Most farmers grow rice for both domestic and export markets (Malawi).

- Rice is recognized as a important marketable crop.

Constraints of rice production in E&S Africa

- Lack of high yielding varieties with good grain qualities.
- Unreliable rainfall amount and distribution.
- Weed, pest, disease, bird, animal, etc.
- Inadequate land preparation (means, timing, quality).
- High cost and not readily available inputs (e.g. seed, fertilizer).
- Land degradation (e.g. catchments area, river basin, wetland) caused by population increase.
- Competition with imported rice.
- Inadequate post-harvest processing.
- Lack of training for key stakeholders.

Technical and Financial Assistance on Rice Promotion in E&S Africa

- Training for researchers and other stakeholders: FAO, IRRI, IITA, WARDA, SG2000, JICA, etc.
- Development of rice varieties: IRRI, WARDA, etc.
- Construction of irrigation and/or rice related facilities: World Bank, AfDB, IFAD, Japanese Government, etc.
- Other cooperation: Multilateral donors, bilateral donors, NGOs, etc.

Examples of Good Practice

Some of them may be applicable in other countries

- Rice is considered as one of potentially important commodities in the national agricultural research and extension system (Ethiopia).
- Research on use of locally available technologies such as animal drawn plough (Kenya).
- Cross breeding of local and NERICA cultivars is done (Malawi).
- Residential and in-field training programmes for scheme managers, technical personnel and irrigators (Tanzania).
- Processing and distribution of NERICA seeds by seed companies (Uganda).

Possible Approach

Productivity, profitability and sustainability

- Improve quality of rice produced and marketed (e.g. variety, seed, pre- and post-harvest operations).
- Improve irrigation scheme management through active/positive participation of key-stakeholders (users).
- Enhance capacity of stakeholders (farmers, stockists, extension workers, researchers, administrators, policy makers) to be integral partners.
- Exchange material and experience beyond national borders (e.g. seeds of potential varieties, equipment, tools, study tour).

NERICA in E&S Africa

It is new, but gradually expanding

- NERICA multi-location trail in 21 sites was conducted in 2002 (Ethiopia).
- Four varieties NERICA were introduced in 2002/03 season (Malawi).
- Rice research sub-programme has set strategies in upland by acquiring NERICA varieties from WARDA (Tanzania).
- A NERICA variety was released in 2002 (Uganda).

NERICA Way Forward

- Sharing information, variety, seed and experience on NERICA among different countries.
- Requesting WARDA to release potential lines of lowland NERICA to E&S Africa as early as possible.
- Standardise the rice research methods (requesting training for stakeholders).
- Improve post-harvest handling.

Direction of Rice Promotion

Consensus building towards “our country, our food”

Each group selected two priority areas out of five issues designated in the questionnaire.

Country	Research and technology development	Availability of input (seed, etc.)	Dissemination/ Extension an training	Post harvest processing and Marketing	Other important issues
Ethiopia	○				○（Capacity building of researchers and extension）
Kenya	○	○			
Malawi	○	○			
Mozambique	○			○	
Tanzania	○		○		
Uganda	○	○			
Zambia	○			○	
Zimbabwe	○			○	
	8	3	1	3	1

Segment 2 Discussion

1. Additional comments and clarification on each country’s presentation using the questionnaire.

Kenya What is the legal implication of testing new variety of rice in Uganda? What are the effects of

introducing new variety to farmers as a testing? Are there any legal requirements such as environmental assessment to implement such testing in Uganda?

Uganda We do not see any problem so far. No claims from farmers. The testing site is deforested area. There are no requirements on environmental assessment. But this may be different from country to country. Extending the new variety over the national border is another issue of legal implication. We recognize that some countries may have strict policy to prohibit exporting certain seeds across the border. But Uganda does not. Mechanism is relaxed. NERICA seed is transferred from Uganda to other countries. But for other countries alike. Some countries may have more strict rules for transferring biotechnology.

Zimbabwe It may not be possible for some countries to transfer seeds across the border. Another issue is seed registration in terms of legal implication of promoting NERICA. If Zimbabwe were provided NERICA seed from WARDA, it does not automatically mean that the seed is registered in Zimbabwe.

Tomitaka I have known that seed registration is a formal procedure in Uganda. But Guinea does not have a formal system to register seed variety. In any cases, we have to follow legal procedures.

Uganda On legal implication of cross-border technology transfer, it is not the issue as long as it is tested. But the purpose is for commercial it may be a different story.

Malawi There is no strict control for cross-border technology transfer in Malawi. WARDA is situated in the western region and Uganda is situated in the eastern region of Africa. But I think there is a harmonization policy established to resolve such issues as cross-border technical cooperation in Africa.

Uganda We feel that development of variety with disease and draught resistant characteristics are of higher priority.

Kenya We would like to address another issue of utilizing university-based resources for development. In Kenya, for example, research and technology development area may be benefited from utilizing Kenya's rich human resources. Kenya has major University-based research capacity available once a better coordination and arrangement is made. Kenyan universities have ability to do so in terms of human resources base such as advanced students in PhD level.

Competition with imported rice in market is another issue to examine. Proper screening of variety is important for maintaining market competitiveness. In Kenya, Basemati rice is a strong preference. Quality aspect should be addressed. Basemati and other imported rice are with high quality and they are extremely competitive. Adaptation of technology is also an important issue to address. Most Kenyan may have willing to pay the farm inputs only if the reasonable yield increase is attained.

Tomitaka AICAD may be a place to further investigate the possibility of university-based research and development. As Mr. Nishimaki of JICA explained in the morning session, selecting lead

country and coordinating the organization of inter border program may be important because of limited resources available if you were to seek Japanese assistance.

I would like to move on to issues on seeds or other input materials.

Malawi Initial seed was brought for farmers to use. Not enough quantity for them to try. Limitation of the seed availability is a problem in Malawi.

Ethiopia Rather than going through all different varieties for selection, Ethiopia would like to incorporate other county's past experience of similar varieties adoptable to save efforts Any comments would be appreciated.

Tomitaka Any help? It may be a role that international research can fit in. Or even WARDA, IRRI, or even Egypt can give Ethiopia help. First thing is to contact them. I believe Ethiopia is introducing rice to the county for the first time. I think consumers favorite varieties need to be identified. Since it is the very initial stage of development, we need to know what are the tastes of Ethiopian locals. Otherwise it is almost impossible to find the one from many varieties.

Ethiopia For the moment, majority of Ethiopian do not have any experience in terms of tasting rice. In terms of cultivated areas, Ethiopia has three different environments. In the black soil area we produced some varieties introduced by IRRI and others since 60s and 70s. Without knowing and assistance from extension, farmers took these varieties to cultivate. In the recent years, Finally research and extension just worked. Five varieties were released.

Tomitaka Even in the rest of Africa, NERICA varieties are new. Push hard to multiplying the seed and anything you can do is valid. If you receive the seed from outside organizations such as WARDA or IRRI, go ahead and cultivate it. In some countries you can harvest up to three times a year under certain conditions. Though none of these countries have yet adopted NERICA thoroughly. You can get any line from WARDA. Show your interest to them to receive their support.

Tamura (TZ) In order for us to find a short cut for selecting specific varieties, we need to establish a network of information on rice production. Effective approach may include standardized research procedures and exchange of data system, etc.

Tomitaka It seems that there is no idea how to select variety quickly but it is important to have a certain system to share information and experience to speed up selection process.

Malawi A structure to coordinate the efforts is necessary for dissemination. For Malawi, for example, Tanzania's experience may be useful if systematically collect and disseminate their experience to share. WARDA and ARI need to show us such existing organizations and institutions which would work to collaborate.

Tanzania There is a network of researchers in Southern African countries.

Ethiopia We have to acknowledge WARDA and ARI's role in development and dissemination. If we do not exploit ARI it is the waste of investment and past efforts. We need to stress that the ARI

should take that part first.

Tomitaka, The most important issue is collaboration of existing institutions. The problem I see here is there is no strong leadership in the region.

Kenya Leaders participating this seminar should be a liaison with ARI. Liaison officers in each country should be named as an output of the meeting.

Tomitaka WARDA has structure contact point for the member countries. (Country officers) Constraint on pilot countries are basically financial reasons. Anyone can get information from ARI and WARDA.

We move on to the issue 3, Extension.

Kenya I am interested in more details on machines which SG2000 is promoting.

Mado We are under development of threshers and polishers. We are trying to manufacture these machines utilizing locally available technology of the country. I believe Kenya has a capacity to manufacture these machines. You may want to look into more detail.

Ethiopia Testing of thresher is underway. These machines are both manual and motorized.

Mado Our basic strategy is to encourage private milling body instead of cooperatives. Because we found that the constraints is maintenance. Promote private threshing and polishing business to private sector so they make money for sustaining operation. We look into local manufacture's capacity because maintenance and manufacturing should be done in Ethiopia

Kenya I would like to know the price of rice compared to imported ones in Uganda and Guinea. Also I would like to know what to do with husks.

Guinea The price is higher than imported ones.

Tanzania Major constraints is the price.

Azuma Husk can be used as charcoals. Even in African country there are some examples.

Kenya Husks are becoming the problem due to the cost to dump. We put them into the animal feeds

Kenya Do we have a sort of a packaged IR XX as a miracle rice ? WARDA initiated PVS for dissemination. I expect a standard package of disseminating the variety.

Tomitaka Now we move on to the next issue, marketing.

As we remember, dissemination of IR 5 was researcher oriented. We have to be careful for it was not driven by consumers and farmers. This is completely different. For that reason it won't happen again.

Post harvest handling is very important because I have heard that mixtures of foreign matter would completely devastate consumer preferences. Introduction of a good milling machine is extremely important for marketing. Competition is very harsh as seen on such an example.

Kenya Polishing or leaving as a brown rice is a thing to consider.

Azuma Typically, Japanese farmers keep rice as brown rice. After one month from polishing, taste is no longer acceptable. In Africa, they store rice in a paddy. Then process to white rice.

I have a question on Zimbabwe's report on banning rice import. It is acceptable for WTO to allow developing countries to ban certain product from import as a restrictive measure to protect local market form export subsidy by producing countries. One or two commodity can be excluded. It is on negotiation right now in Geneva.

Zimbabwe Given the amount imported, I used the strong word. Zimbabwe is a member of WTO. But banning is not implemented.

Tomitaka All countries participating in this RT discussion are net importers except Malawi. One suggestion that I can give is to consume locally available foods at all boarding schools, prisons, and any other government institutions.

Kenya Low price of incoming rice is always a problem. In Kenya, typical price of rice is 800 shr. They are from Egypt. One estimate suggests that a break-even price of local rice is 4000 shr. My question is how we can effectively promote locally produced commodity effectively. Do you think a 2.5 tons/ha level of NERICA can compete such price?

Kenya Use of expensive herbicide is not an answer. Production cost itself is an issue. Egypt is not a major player for rice export, Vietnam and Pakistan after 30% duty is still very cheap. Local cost is a very serious problem. Government should provide subsidy for land development. Appropriate macro policy including the subsidy to fertilizers etc. farm inputs are needed.

Tomitaka We may even achieve even tons per ha level but the production cost may be more expensive. I would like to move on to Possible approach and Activities/Visions on NERICA

Kenya I would like to propose establishing a common approach on NERICA through networking among participating countries. We need to have a strategy to develop database. Common approach is to sit together to share our experiences.

Tomitaka I think it is a valid view, but how do you materialize? What is a common approach, and please give more specifics.

Uganda Status of development of rice is different in Africa.

Kenya Common approach may include strengthening collaboration through information sharing. Most important stakeholders are consumers. The preference varies country to country.

Tomitaka Information, lessons and suggestion from various stakeholders may be shared. That is the meaning. I think they are the roles that WARDA plays.

More provision of seed to Guinea and Malawi. Strong network of NERICA information sharing is needed. Our experience shows that sharing information and experience is important. We need to create a forum for doing so.

Marketing is critical. It underlines agro-processing issues. Building capacity of home

	economics. Processing is easy to promote. But at the household level. Grain consuming culture is different from grain fed culture. Adoption is one of the issues directly related to marketing
Kenya	Even in Kenya. Coast region and highland region differs. WARDA should accelerate developing lowland NERICA to distribute seeds to more countries.
Zimbabwe	I think regional approach is critical. Way down from Zambia, Mozambique and Zimbabwe, something has to be done soon.
Tanzania	We need strong bug resistant variety in Tanzania. Variety is very important. Selection process should be much improved.
Kenya	Africa is huge. WARDA should establish a branch part in certain region. West Africa has a network existing. How about establishing a new rice research institution in east and central Africa
Tomitaka	No international community would support such an idea because WARDA is the one to play such role. The Philippines has established a research center of their own. If it is such important your government should do it in your own.
Ikeda	UNDP has instantiated the item 4, post harvesting. The donor supported food processing industry and agro-based industry. Why do they support the processing industry? Development and dissemination of technology. In most comprehensive approach, they are equally important. The whole discussion right now is from supply side. But marketing is equally important.
Nozaka	Each country is in different phase of disseminating (or developing) NERICA. I suggest a standardized research method along with funding provided.
Tomitaka	Standardized research method already exists and they are internationally recognized using a basic manual. WARDA has one, too. JICA is not in a position because we are not a research institution, but JIRCAS may be. If necessary we may organize say a one-week workshop on such topics on NERICA research in the future.
Sato	From JICA's perspective, such technical cooperation may be possible.
Tomitaka	I think information sharing should be possible through Japanese experts. Standardization may be helpful for the crosscutting issues among African rice production. Upland rice in Africa is cultivated for long time. Lowland is later introduced after upland rice. When WARDA was established in Liberia, then moved to Ivory coast, ecosystem of rice producing situation was taken into consideration, particularly slash and burn, yield of upland rain fed was very low.

Synthesis of Group B: Eastern and Southern Africa

Ethiopia, Kenya
Malawi, Mozambique
Tanzania, Uganda
Zambia, Zimbabwe

46 participants including observers

For a better tomorrow for all rice stakeholders

Present Conditions (1)
Important as food crop and cash crop

- Rice ranks 2nd or 3rd important cereal in some countries in E&S Africa.
- Rice consumption is increasing in many countries in E&S Africa.
- Rice is imported by many countries in E&S Africa.
- Most farmers grow rice for both domestic and export markets (Malawi).
- Rice is recognised as a important marketable crop.

Present conditions (2)
Constraints of rice production in E&S Africa

- Lack of high yielding varieties with good grain qualities.
- Unreliable rainfall amount and distribution.
- Weed, pest, disease, bird, animal, etc.
- Inadequate land preparation (means, timing, quality).
- High cost and not readily available inputs (e.g. seed, fertiliser).
- Land degradation (e.g. catchment area, river basin, wetland) caused by population increase.
- Competition with imported rice.
- Inadequate post-harvest processing.
- Lack of training for key stakeholders.

Technical and Financial Assistance on Rice Promotion in E&S Africa (tentative)

- **Training for researchers and other stakeholders: FAO, IRRI, IITA, WARDA, SG2000, JICA, etc.**
- **Development of rice varieties: IRRI, WARDA, etc.**
- **Construction of irrigation and/or rice related facilities: World Bank, AfDB, IFAD, Japanese Government, etc.**
- **Other cooperation: Multilateral donors, bilateral donors, NGOs, etc.**

Main contributors in agricultural development: Implementing countries and their people/farmers

Examples of Good Practice

Some of them may be applicable in other countries

- **Rice is considered as one of potentially important commodities in the national agricultural research and extension system (Ethiopia).**
- **Research on use of locally available technologies such as animal drawn plough (Kenya).**
- **Cross breeding of local and NERICA cultivars is done (Malawi).**
- **Residential and in-field training programmes for scheme managers, technical personnel and irrigators (Tanzania).**
- **Processing and distribution of NERICA seeds by seed companies (Uganda).**

Possible Approach
Productivity, profitability and sustainability

- Improve quality of rice produced and marketed (e.g. variety, seed, pre- and post-harvest operations).
- Improve irrigation scheme management through active/positive participation of key-stakeholders (users).
- Enhance capacity of stakeholders (farmers, stockists, extension workers, researchers, administrators, policy makers) to be integral partners.
- Exchange material and experience beyond national borders (e.g. seeds of potential varieties, equipment, tools, study tour).

Towards improving lives of rice stakeholder farmers

NERICA in E&S Africa
It is new, but gradually expanding

- **NERICA multi-location trail in 21 sites was conducted in 2002 (Ethiopia).**
- **Four varieties NERICA were introduced in 2002/03 season (Malawi).**
- **Rice research sub-programme has set strategies in upland by acquiring NERICA varieties from WARDA (Tanzania).**
- **A NERICA variety was released in 2002 (Uganda).**

Evaluation of NERICA varieties.
Production of NERICA seed.
NERICA based farming systems.
Training for stakeholders on NERICA.

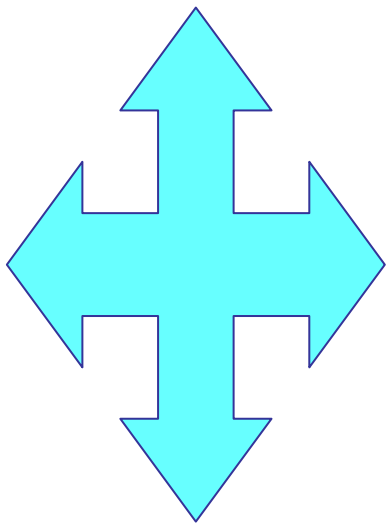
NERICA Way Forward

- **Sharing information, variety, seed and experience on NERICA among different countries.**
- **Requesting WARDA to release potential lines of lowland NERICA to E&S Africa as early as possible.**
- **Standardise the rice research methods (requesting training for stakeholders).**
- **Improve post-harvest handling.**

Direction of Rice Promotion

Consensus building towards “our country, our food”

Irrigated plots



Upland plot

①Human resources (training and linkage)
②Production resources (seed & other inputs)
③Post-harvest processing and marketing
④Environmentally friendly technologies

RICE QUALITY

PRODUCTION COST

Patronise food produced in the country among people (farmers, merchants, consumers & officers)

Development of rice industry requires continuous efforts of stakeholders

For pursuing environmentally, socially & economically sustainable farming systems

G. Wrap up Session

WRAP UP
OF
SEMINAR ON PROMOTION OF RICE PRODUCTION AND DISSEMINATION IN AFRICA

PURPOSE

Share Current Situation and Problems on RICE among Participants.

KEYNOTE SPEECH

Define direction of approach for assistance from the view points of JICA by Mr. Azuma and of FAO by Dr. Guimaraes.

Session 1: Agricultural Development and Rice Cultivation

Describe cases of activities on Tanzania (Sokoine University of Agriculture), Kenya (Kenya Agricultural Research Institute), and UNDP

Session 2: Agricultural Development by JICA

Show two JICA projects.

1. The Small Scale Irrigated Agriculture Promotion Project (Ghana)
2. Killimanjaro Agricultural Training Center Project (Tanzania)

Session 3: NERICA

Focus on NERICA, we recognized constraints and opportunity of NERICA from several organizations who really carry out activities on NERICA in fields.

Group A

Group B

Round Table Discussion

Group	A	B
No. of Countries	9	8
Rice Rank in cereal crops	1 to 4	2 to 8
Rice Self	Low	Low except 1
Majority of cultivation area	Rainfed	Rainfed/Irrigated

Summary

Group	A	B
Possible Approach	1) Conduct integrated approach. 2) Improve quality and productivity.	1) Improve quality of rice 2) Improve Irri. Scheme. 3) Enhance capacity. 4) Exchange material and expericence
NERICA	1) Need seed bank. 2) Need credit for inputs. 3) Need package of production tech. 4) Characterize NERICA. 5) Need seed production and distribution system.	1) Share information 2) Want NERICA lowland 3) Standardize the research 4) Improve post harvest.

Annex-1

List of Participants

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Annex-2

The Participants' country information on rice

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GAMBIA

COUNTRY REPORT: - THE GAMBIA

AN OVERVIEW OF

THE CURRENT RICE SITUATION

IN THE GAMBIA

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AN OVERVIEW OF THE CURRENT RICE SITUATION IN THE GAMBIA

1. Background

In The Gambia, subsistence rainfed rice production, under four different rice growing ecologies (upland, hydromorphic / shallow flooded, freshwater swamps, and seasonal saline mangrove swamps) is the predominant system of growing rice, accounting for 85.5% of the estimated cultivated hectarage of 15,704 ha.

However, although the semi-arid tropical climate, with its high solar radiation provides favourable conditions for rice productions, crop yield reduction or failures often occur, due to other unfavourable climatic conditions of a short rainy reason, characterised by low rainfall with erratic distribution.

Consequently, the availability of water is the principal limiting factor to increased rice production in THE GAMBIA.

2. Rice Development Strategy

With rice being the major staple, the Gambia's long term development strategy is the attainment of rice self-sufficiency, based on the recognition of the fact that available date indicates that sufficient land is available to expand production to the level required to attain self-sufficiency.

To this effect, research and extension efforts have been focused on the screening, selection, promotion and adoption of environment specific suitable varieties, with emphasis on early-maturity, given the climatic conditions described above.

Furthermore, in recognition of the need to ensure the availability of water to enhance increased rice production, several interventions, to develop and promote irrigated rice production, have been launched, since the time to the Colonial Government, when irrigated rice production was first introduced by the then British Colonial Development Corporation (CDC) in 1948.

The River Gambia, is the most important source of water availability for crop production, with abundant surface water for irrigation within its fresh water zone, all year round. Furthermore, it is recognized that the large areas of swamplands existing along the river, have the potential for increased rice production and productivity, through the expansion of irrigation, with the provision of improved infrastructure for the improved water control management and the widespread adoption of improved rice technologies.

3. Constraints to Increased Rice Production

Besides the climatic limitation of a short-rainy season, characterised by low rainfall, further dramatic changes in the climatic conditions over the years has led to a significant decline in rainfed rice production and productivity. Also, despite numerous interventions with swamp development projects, very little progress has been achieved in irrigation expansion, or the development of sound management systems for sustained development of irrigated rice production.

Furthermore, increasing severe resource constraints, affecting the availability of major production inputs like seeds, fertilizers, machinery, credit support to farmers, etc. have frustrated efforts to enhance increased rice production and productivity.

4. The Way Forward for Sustained Increased Rice Production

Cognizant of the need to ensure the availability of water to enhance increased rice production and productivity, major efforts in rain water harvesting and conservation in in-land valleys, and lowlands, have been on-going and expanding for the last several years with a major intervention The Lowland Agricultural Development Project (LADEP), funded by the African Development Bank (ADB), and the International Fund for Agricultural Development (IFAD).

With assistance from the Republic of China (Taiwan), efforts are also under way to develop and expand low cost tidal irrigated rice production.

The Gambia is also fortunate to be included in the African Rice Initiative (ARI), which is aimed at the promotion of the production and dissemination of NERICA. Already, through the participation of our National Agricultural Research Institute (NARI), the WARDA support Participatory Variety Selection (PVS) programme, a number of NERICA varieties have been identified as suitable for our upland rainfed conditions. Also with funding from UNDP, NERICA seeds were obtained from the Republic of Guinea, and distributed to farmers during the 2003 cropping season.

GHANA

SEMINAR ON PROMOTION OF RICE PRODUCTION AND DISSEMINATION IN AFRICA:

SUMMARY OF PAPER ON SUSTAINABLE DEVELOPMENT AND PROMOTION OF RICE FOR FOOD SECURITY IN GHANA

PRESENTED BY:
SAMMY M. AKAGBOR (DIRECTOR) AND ALBERT F. SWATSON (AGRONOMIST)

1. Introduction

The outlook for the food security of many developing nations including Ghana is a cause for serious concern. The problem of food security is exacerbated by the rapid growth of population and hence of the increase in demand for food. Provided that it is economically viable, increased investments into technologies and crop production practices could become a key source of agricultural growth as well as of poverty alleviation for farmers who otherwise unduly depend on low and erratic rainfall. It would help to increase the productivity of land, reduce, albeit to a limited extent, the need for extending the cultivated area for feeding the rapidly growing population.

Rice is among the four (4) major cereals, viz maize, millet and sorghum which are locally produced and consumed in Ghana. The demand far exceeds local production, resulting in large quantities being imported every year into the country.

Rice has become an increasingly important staple food commodity in the national economy of Ghana, due to the rising population, rapid urbanization, increasing per capita consumption, and trade liberalization. Despite the existing potential for increasing national rice production as a result of the presence of abundant favourable ecologies, Ghana imports about half of its rice requirements.

It has been estimated that the per capita consumption of rice has more than doubled from 14 kg/year in 1992 to 25 kg/year in 2000. The growing trend in the consumption of rice is due to increasing population, rapid urbanization, the relative ease of preservation and cooking, and the development of the rice trade as a result of trade liberalization.

2. RICE CULTIVATION PRODUCTION IN GHANA

The Government of Ghana has given priority to a national programme aimed at attaining self-sufficiency in rice. The Government also established the Special Programme for Food Security since 1998 to help the farmers. Rice is a cash and food crop to the majority of farmers. Farmers in general consumed less than

30% of the rice produced and sell the remaining for needed cash. The increases in rice yield and production, therefore, could increase the incomes of farmers and reduce poverty in rural areas at the same time make rice more available to the population in major urban centres. The large quantity of rice that the Government has to import yearly to satisfy the population's demand indicates that there is a ready and favorable market through which rice farmers in the country could sell their products at favorable prices. The increase in domestic rice production would enable the country to save foreign exchange from rice importation for the provision of basic services such as health care, education and reserved-food stocks for emergencies in order to reduce human insecurity.

2.1 Production Areas and Ecologies

Rice is produced in all the ten (10) regions of Ghana in three (3) major ecologies:

(i) Rainfed upland
(ii) Rainfed lowland/inland valley swamps
(iii) Under irrigation

The first two ecologies account for nearly eighty to eighty-five (80-85) percent of production. Yield levels are generally low 0.9 to 2.1 tons/ha except under irrigation where 4-6 tons/ha are obtainable.

The Rainfed Lowland (Hydromorphic) ecology represents about 75% of the rice area in Ghana and thus has the greatest influence in the determining national average rice yield. Hence an average paddy yield of 3.8 t/ha will approximately represent the national average. On the basis of a national average yield of 3.8 t/ha the annual production of milled rice could increase from 153,000 mt to 271,800 mt per year. (Note that this includes second crop from 10,000 ha of irrigated fields).

This will represent 60% rice self-sufficiency, which is a major increase compared to the 30 - 47%. This option is achievable and must be pursued with great intensity.

2.2 Government Policy on Rice Promotion

In line with the objectives of the Ghana Poverty Reduction Strategy (GPRS), the Accelerated Agricultural Growth and Development Strategy (AAGDS), the Food and Agricultural Sector Development (AgSSIP) of the Ministry of Food and Agriculture (MoFA), all of which seek to improve food security, reduce poverty and improve import substitution, the government has committed itself to boost domestic rice production, generate employment, save foreign exchange

through import substitution, and reduce rice imports by 30% by the year 2004. Some of the government rice promotion projects are captured in the table below.

2.3 The National Rice Development Committee

In order to achieve this aim of Government, MOFA inaugurated the National Rice Development Committee in 2002. The committee was changed to develop a wholistic programme for the increment of rice production to meet the requirements of government to achieve self sufficiency in rice production in the immediate future. The committee has proposed a plan with three components as follows:

a) Intensification of rice production in selected irrigation projects.
b) Conducting of a study leading to the mapping out of suitable areas for rice development projects in the rainfed lowland/hydromorphic ecology and updating of previous feasibility studies on irrigation projects earmarked for rice production.
c) Addressing the production, extension, processing and marketing needs of rice producing areas.

3. RICE PRODUCTION UNDER IRRIGATION: THE SSIAPP INTERVENTION

3.1 Irrigation Development and Rice Industry Promotion

Out of the 22 irrigation projects, 9 are mainly rice producing projects. Even though the area under irrigation for rice production is about 5,000-7,000 ha contributing about 16% of the rice production in the country, production under this ecology is not only more reliable and controlled but it produces good quality rice. It is projected that with improved technologies and 200% cropping intensity this can be raised to between 30-40% of the national production.

Intensification of rice production in selected irrigation projects is therefore considered as the short term thrust that will result in a tremendous increase in the rice production.

Currently, public irrigation schemes are operating at extremely low levels of efficiency due mainly to the deteriorated infrastructure, management weakness and lack of sense of project ownership by the primary beneficiaries. Consequently, the rice production system on these projects is poor and the industry is of minimum attraction to farmers. The system is characterized with low yields, mixed seeds, inappropriate technologies, poor marketing and quality. The consequences are that, the final product is unattractive to the consumers and cannot be compared with the imported rice.

Further to this notion a request was made by the Government of Ghana to the Government of Japan through JICA to assist in the improvement of irrigation practice. A technical co-operation was started in 1988, which later developed into a mini project and finally the Small-scale Irrigated Agriculture Promotion Project (SSIAPP) which is a project-type technical co-operation.

The main goal of SSIAPP is to establish a sustainable farming system for small scale irrigated farming and consequently to increase income of farmers on the two model projects (Ashaiman & Okyereko).

General achievements under the SSIAPP were established in all the outputs. The baselines surveys, component technology improvement, verification of farming systems, supporting systems and training collectively helped in the achievement of project purpose e.g. Improved capacity on irrigation farming technologies, management and training, and improved irrigation farming with transparent farming support systems.

The SSIAPP Follow-Up has been designed to extend the positive impacts experienced during the SSIAPP period to the other 20 irrigation projects. The overall goal is for the farming systems in all irrigation projects under GIDA to be improved.

The project purpose is to establish guidelines and strategies to improve the farming systems on each of the projects. The concept is in line with the GIDA strategy of farmer participation for sustainable crop production under irrigation.

4. THE NERICA PROGRAMME IN GHANA

4.1 Introduction

In Ghana, resource-poor farmers cultivate rice under a wide range of agro-ecologies. More than 75% of rice areas are under rainfed conditions. The annual rainfall varies between 800 to 2,400 mm and generally decreases from South to North and from West to East. The climate varies from the bi-modal rainfall equatorial type in the South to the typical mono-modal monsoon type in the North. The rainfed upland and hydromophic rice production is cultivated under the bush-fallow shifting cultivation systems. Rice is planted either as mono-crop or in a mixture with other food crops. In areas under bi-modal rainfall pattern, upland rice is planted in the main rainy season from March to July. Farm sizes in upland and hydromorphic areas are predominantly small to very small. About 60% of the farms are less than 1.2 ha. In rainfed and irrigated lowland areas, the farm sizes are much smaller, varying from 0.2 to 0.8 ha per

farm and rice is planted as mono-crop; one crop per year under rainfed conditions and double crops under irrigated condition.

4.2 Research Activities

In Ghana, the NERICA varieties have been introduced and tested in different regions since 1997 by the Research Institutions i.e. Crop Research Institute (CRI) Savanna Agricultural Research Institute (SARI) and the University of Ghana Agric Research station, Kade, (ARS-Kade). Based on the results from the participatory varietal selection and on-farm trials conducted during 2000-2002 period, the research systems in the country has identified the eight following NERICA lines to be suitable for rainfed upland and hydromorphic areas in the countries.

4.3 The Special Programme for Food Security (SPFS) Strategy and Approach for Nerica Promotion

The long-term objective of this project is to contribute to the implementation of the Government's policies and priorities in the agricultural sector, in particular, food security and poverty alleviation of the rural population, through the dissemination of NERICA and improved rice varieties, rice integrated crop management systems, and technologies for the full utilization of rice grains and biomass to increase the productivity of rice production systems in the country.

The project has focused on increasing staple food (rice) production in low-input farming systems, through the introduction and dissemination of innovative and improved technologies to poor farmers and other vulnerable groups in the country under the framework of the Special Programme for Food Security (SPFS).

5. THE NERICA PROGRAMME AT IDC (SSIAPP)

Some preliminary trials on Nerica have been carried out at the Irrigation Development Centre as part of SSIAPP activities over the past four years. Nine interspecific rice varieties (sativa x glaberrima) developed at WARDA were brought to the centre for trial after the JICA Expert on Rice Cultivation had attended a workshop for rice researchers at Cote d'ivoire during the early part of the year 2000. The objective then was to observe the performance of these varieties under both upland and lowland (irrigation) conditions.
In 2001 the Ministry of Food and Agriculture (MoFA) requested SSIAPP to evaluate the yield of four (4) specific lines of Nerica at its experimental field at Ashaiman. Yields recorded were between 2-3 t/ha (Table 5a & 5b).

In March 2003, F.A.O in line with the UNDP's programme of Nerica development and extension requested the Ministry of Food and Agriculture (MoFA) Ghana, to multiply foundation seeds for supply to peasant farmers around the country. As a result of excellent facilities at Ashaiman, FAO through MoFA (Ghana) and JICA in collaboration agreed and requested SSIAPP to establish the seed multiplication project at IDC.

GUINEA

BRIEF OUTLINE OF RICE FARMING IN GUINEA

By Sekou BEAVOGUI
Aly Conde
Tareke BERHE

Introduction

This paper falls within the framework of the seminar organized by the Japanese International Co-operation Agency (JICA) on the topic "Promotion of production and dissemination of rice in Africa", that was held at the African Institute for Capacity Building (AICAD), in Nairobi, Kenya, from 10th to 11th February 2004.

Guinea's experience in terms of promotion of production and dissemination of NERICA (New Rice for Africa) will be presented in a separate paper in the course of this seminar. This paper gives a general outline of rice farming in Guinea. The place of rice in Guinea's economy is presented in the first part. The second part talks about the main rice production systems while the third part deals with genetic diversity of rice. Part Four deals with the way forward in terms of rice production.

1. The place of rice in Guinea's economy

Rice is the staple food in Guinea. According to DYNAFIV (2003), rice consumption varies depending on the natural climatic regions:

- Lower Guinea (Basse Guinea) 100-120 kg. per person per annum
- Forest Region (Guinee Forestiere) 100-110 kg per person per annum
- Central Guinea (Moyenne Guinee) 60 kg per person per annum
- Highlands region (Haute Guinee) 50kg per person per annum

The average national consumption is around 90 kg per person per annum.

In 2001, the consumption needs were estimated to be 765,000 tons for a population of 9 million people in theory, 70% of which consisted of locally grown rice and 30% of imported rice. Rice imports, which stood at 300,000 tons in 1992 dropped to 153,000 tons in 2000 before increasing to 330,000 tons in 2002. The drop in imports in 2000 was due to promotion of local rice which is accorded an incentive of 20% to 30% in comparison to imported rice. As a matter of fact, supply of local rice to Conakry went up from 6,000 tons in 1994 to 40,000 tons in 2000.

According to SNSA (RNA 2000-2001), the total surface area cultivated with rice for the period 2000-2001 stood at 665,637 ha of which 512,059 ha consisted of monoculture (76,93%); 151,599 ha in mixed farming with rice as the main crop (22.77%) 1,979 ha in mixed farming with rice as secondary crop (0.30%).

The total surface area cultivated with rice represents 41.70% of the total farmed area which is estimated to be 1.596,218 ha for the period spanning 2000-2001.

2. Rice farming system

Guinea enjoys all types of rice farming ecosystems found in Africa, that is irrigation farming, wet lowlands, wet plateau, mangrove and farming in dips. These are categorized in the following manner:

2.1. Rice farming in the plains

Rice farming on the plains is done in the highlands (Haute Guinee) and covers close to 200,000 ha. It is subject to climatic difficulties such as drought and the risk of excessive floods. The main characteristics of this type of farming are:

- Farming in flooded river basins
- Farming in ….crue
- Permanent area farming
- Peasant farming with limited care
- Rice farming using hydro-agricultural methods
- Mechanized rice farming (animal traction) and tractor-based
- Rice farming using different types of immersion methods and different farming cycles
- Individual land owned farming
- Annual sediment addition with different levels of production (>2t/ha in a good season; 1 t/ha in an average year – and none in a year with excessive floods or drought)
- Technical use limited to ploughing, sowing, harvesting and processing.

Farming using plain fields water depends on typo-sequence (beneath river beds, ground water) and the farming system depends on the typo-sequence. Thus farming is done in the following areas:

- Plateau farming: tobacco and maize farming
- Low bench farming: market gardening, tobacco, maize, short-cycle rice farming
- Lowlands: short-, medium- and long-cycle rice farming and market gardening.

2.2. Rice farming in dips

According to ADRAO, dips are characterized by their position vis-à-vis the lower part of the drainage. The basin drains all the water from a dip network, starting from the beginning of the crater (of the plateau), passing through the hydromorphous zone (with shallow ground water) down to the dip itself.

The dip is therefore an extension of the riverbed into a flat surface or slightly concave surface, with the lower surface area of approximately fifty hectares (a larger surface area is referred to as a plain).

There are different levels of dip farming methods depending on:

- Surface type
- River type
- The needs of the peasant farmers.

Type 1: simple partitioning of the land by using small dykes in racks

Type 2 : an evacuation drainage is added to the racks for draining excess water during low period

These two levels only allow one to control the ground water level in the dips.

Type 3: this is an addition to type 2 and uses an irrigation canal to let water into the racks.

Type 4: type 3 is equipped with a small inlet to keep water and thus feed the irrigation network, even during the dry season. This type of method has in addition a shallow outlet and links to the irrigation canals.

The different phases during which dips are used are as follows:

- Seedbeds
- Soil preparation (clearing the land, keeping it moist and leveling it)
- Transplanting
- Water management (siphoning it out).

From the point of view of potential, this method holds third place in national potential for land management after mangrove farming and plain flooding land. Statistics from the BTGR indicate that the potential of this method is 603,293 ha of which 18,248 ha are currently in use, that is 30.24%.

Yield from peasant farming varies on average 2 to 2.5 t/ha depending on the farming techniques and the variety used. Yields obtained from improved varieties reach as high as 4 to 6 t/ha.

2.3 Hillside or plain rice farming

This is the main type of rice farming and it has the following characteristics:

- ✓ It relies on rainfall and is seasonal in nature (rainy season). It is subject to climatic risks such as drought.
- ✓ Itinerant rice farming which is integrated in a crop system (mixed crop farming, rotation farming). It occupies a lot of space and carries an environmental risk through clearing of new land or burning land for cultivation.
- ✓ Family type of farming using manual methods and hard labour. It is not intensified and productivity is low (1,500 kg/ha) of small scale farming
- ✓ Increased pressure on land use due to population growth and competition from other crops that occupy the land for a long period.
- ✓ It helps to create balance and reproducible, unless pressure for land use increases significantly (the current population density is > 40/km². In that case, land is left fallow for short periods (less than ten years) thus leading to depletion of soil fertility, adventitious pressure and reduced yields (1t/ha).

There are many constraints linked to this type of farming:

- Low productivity of rice farming, and difficulties in improving it with traditional methods such as different varieties, manure and plant cover
- High environmental risks if pressure on land increases and this will lead to destruction of vegetation cover, low fertility of the land thus could lead to farmers giving up rice farming and opting to grow crops that take a long period
- Difficulties for farmers to access inputs and loans.

2.4. Lowland or mangrove rice farming

Mangrove or lowland rice farming represents:

- Mangrove 380,000 ha
- Mangrove rice farming 142,000 ha
- Sea shore 12,000 ha
- Traditional farming land either in use or abandoned 130,000 ha

Seashore land that is currently or was formerly under seawater is very fertile for rice farming. However, it requires special measures to make it productive (4t/ha).

Different types of farming are practiced depending on the areas:

✓ Farm land in the vast plains along the sea shore (Kakossa, Kaback, Koba, Monchon): this requires heavy investment. Yields are high (3-4 t/ha) and reliable if there is proper water management (dykes, gates and drainage) and if organic fertilizers and minerals are used.

✓ Traditional farming areas in the estuaries : these require light work to keep off sea water intrusion during the farming season which at the same time controlling fresh water supply. This type of farming, practiced by peasant farmers and known as 'bougounis', is based on the principle of keep off salt water permanently from the cultivated areas. The land then becomes acidic and unproductive after a number of years. The solution to this problem lies in letting in salt water once again through more adapted methods.

✓ Polder de Yaugoyah : this is land farmed on an experimental basis and covering 12 ha. The method uses alternately salt water during the dry season and fresh water during the wet season to prevent acidification of the soil and thus promote natural fertilization through the sea basin and also by protecting the rice from the effects of drought at the end of the dry season by retaining water upstream. This method has helped to increase the yield significantly over the last six years. It has also enabled the practice of mixed farming (market gardening, fish farming) through water retention.

✓ The PDRI-GM area : this project covers a surface area of 2,600 ha according to the polder model cited above and also involves additional measures such as good organization of the farmers, seed banks, paddy banks, access to loans, etc.

3. Genetic diversity of rice in Guinea

3.1. The importance of genetic diversity

There are 4 species of rice in Guinea including two wild species and two which are cultivated:

✓ Wild species : these include *Oryza longistamina* (which reproduces by rhizome method) and *Oryza breviligulata* (which is autogamous).

✓ Cultivated species: these are *Oryza sativa* and *Oryza glaberrima.*

O. sativa has flowing panicles with many branches and it has higher yield than *O. glaberrima.* It is more resistant during picking and it has pubescent leaves.

Oryza glaberrima has straight panicles with fewer branches and its yield is similarly low. It is tolerant to diseases, parasites and invasion by grass. Similarly, it does well on poor soil.

Guinea enjoys quite a wide genetic diversity. A survey carried out by M. B. Diallo (2002) in 18 villages of the lowlands (Basse Guinee) (Boffa and Boke areas) produced the following findings:

Table 1 : Number of varieties by species and type of rice growing

Type of rice crop	Oryza glaberrima	O. sativa	Total
Pluvial	21	79	100
Mangove	0	75	75
Fresh water	1	27	28
Total	22	181	203

The genetic diversity is to be found in terms of vegetation cycle, environmental adaptation and quality of the grain.

Diversity according to the cycles adaptation

- Short cycle : 90-120 days
- Medium cycle 130-150 days
- Long cycle 160-200 days

Diversity depending on environmental

- adaptable to floods
- adaptable to drought
- adaptable to salinity

Quality of grains:

- Aroma
- Quality of cooking method (swelling, taste)
- Translucidity

3.2. Peasant farming management method of genetic diversity

Peasant farmers play an important role in management of diversity of the varieties. Both wild and cultivated species co-exist on the rice fields. The cultivated types also come into contact by chance or by design in the rice fields.

3.3. Use of genetic diversity

Genetic diversity is used by (a) farmers for environmental adaptation, and for many other uses such as family consumption or trade) and by agricultural specialists seeking to collect different varieties for improvement and development of new varieties. For instance, the Kisisi Agricultural Centre in Kisisi have come up with varieties that are resistant to iron toxicity. The Rokupr station (Sierra Leone) has developed Rok05 and Rohyb-6 which are resistant to salt, ADRAO has also produced different other high yield varieties (WAR, WAB, WITA).

4. Way forward for development of rice farming in Guinea

Local rice growing is faced with stiff competition from imports owing to high production costs and a drop in world rice prices. The Government of Guinea with the support of its development partners have formulated strategies to enable it to achieve food security.

Guinea thus came up with a national strategy and policy for the development of irrigation with the help of FAO (1999-2001). The French Development Agency funded the preparation of a master plan for rice growing in mangrove zones in the Kappachez basin and the Rio Nunez west banks.

The national strategy document on food security (MAE/FAO 2003) recommends setting up a policy on the protection of local rice growing through a system of taxation of imported rice and improvement of the quality of local rice to enable it to get an incentive of 20-30% that consumers have accepted to pay.

A special project on food security funded by the FAO/ADB was started to support a component of rice growing. Most of the projects on rural development (PADER/ADB, PPDRHG/FIDA, PADER-BGN/FIDA/ PRAADEL/FIDA, PPDR-GF/FIDA) includes a component for action research on rice growing and support for production and sectors dependent on rice farming.

NGOs such as SG200 participate in the promotion of production and dissemination of rice by improvement of farming systems, seed production and technologies for preservation and post-harvest processing.

Guinea is among the seven countries that benefit from funding from the African Development Bank for a project of dissemination of NERIA rice (Benin, Gambia, Ghana, Guinea and Mali, Nigeria, Sierra Leone). The amount of funding for Guinea is US$5.36 million or 3,87 UC.

The research component for the Priority Solidarity Fund funded by the French government for the period 2003-2005 includes funding for Sustainable Agriculture which will partly fund research in rice growing.

The USAID and the World Bank (PACV 2) have also promised funding for agricultural services in the coming years.

IVORY COAST

MINISTRY OF STATE
MINISTRY OF AGRICULTURE

REPUBLIC OF IVORY COAST
Union-Discipline-Work

SEMINAR ON THE PROMOTION AND DISSEMINATION OF RICE IN AFRICA.
(Nairobi, KENYA, 10-11 February 2004)

ROUND TABLE ON THE SITUATION OF RICE IN AFRICA
CASE STUDY OF IVORY COAST

Part 1: BACKGROUND
(Presented by M. Minayaha Siaka COULIBALY, Ministry Technical Adviser)

I/ SOME GEOGRAPHIC AND ECONOMIC CHARACTERISTICS

1-1 Main geographic and demographic characteristics

- Ivory Coast is situated in West Africaand covers a surface area of 322 463km²;
- It borders Mali and Burkina Faso in the North, the Atlantic Ocean in the south, Ghana in the east, and Guinea and Liberia in the west.
- It is in a sub-tropical zone and its climate is characterised by:
  - An average annual temperature of about 30°,
  - Two rainy seasons alternating with two dry seasons in the southern region,
  - Two rainy seasons alternating less regularly with two dry seasons in the central region,
  - One rainy season and one dry season in the north,
  - A relatively abundant pluviometry with a southern negative gradient in the north and a western one in the east whose annual precipitation is 2000mm maximum in the south-west and 900mm minimum in the north-east,
  - It has a tropical forest vegetation in the south, **sparse forests in the centre, dense woodland in the north,

- The population was 15,4 million during the last official census in 1998 with an annual 3.8% economic growth rate and a rural population of 56.6%.

1-2-Some economic characteristics

- The economy is based on agriculture which contributes 40% of GDP and employs more than half of the active population;
- Main export products: cocoa (largest exporter with 1 200 000 tonnes annually) and coffee (third largest exporter with 300 000 tonnes annually);
- Other export products: palm oil, rubber, bananas, pineapples, cotton, cashew nuts (Anacarde), wood;
- Subsistence crops are an important part of the economy contributing more than 20% of the GDP.

II/ LAND RESOURCES AND CROP FARMING

- 31 800 000 ha out of a surface area of 32 246 300 ha is arable land;
- Only 22% of this is used for agriculture;
- The following are the principal subsistence crops according to statistics of 2001:

Crops	Surface area planted (ha)	Production (t)	Output (t/ha)
Rice	600 000	940 000	1.57
Maize	490 000	625 000	1.28
Yam	350 000	3 010 000	8.6
Cassava	320 000	1 700 000	5.3
Banana Plantain	250 000	2 800 000	11.2

- These crops are cultivated in all regions in the country but in varying proportions depending on eating habits and the rate of urbanisation in these regions;
- They are mainly meant for home consumption and the excess is taken to the surrounding areas for sale;
- The other crops being very perishable and having more constraining cooking methods, the population explosion and urbanisation led to rice becoming

the staple diet especially in urban areas where imported rice is less expensive that locally produced rice;

- ❖ As a result of these factors the consumption of white rice moved from 123 000 tonnes to 1 151 833 tonnes from 1960 to 2001;
- ❖ This situation led to an annual production growth deficit, which necessitated the importation of 640 559 tonnes of white rice in 2001, at a total cost of 95.36 million francs CFA which corresponds to more than 160 million US dollars.

III/ THE RICE ISSUE AND THE IMPLEMENTATION OF A GLOBAL RICE STRATEGY TO PROMOTE ITS PRODUCTION

3-1- The Issue of Rice in Ivory Coast

- ❖ Current production deficit: about 700 000 tonnes of white rice;
- ❖ To avoid importing these 700 000 tonnes of white rice, 1 273 000 tonnes of supplementary paddy should be produced to total to an annual 2 213 000 tonnes of paddy;
- ❖ To produce 2 213 000 tonnes of paddy, a minimum of 1 410 000 hectares need to be cultivated to maintain an output of 1.57 t/ha;
- ❖ Human and financial recourses being available to achieve self-sufficiency in rice and guarantee lasting food security, our country needs to implement suitable strategies;
- ❖ Hence the interest in developing the production of NERICA which, among others has the quality of having a high output, strong resistance to pests and drought and a relatively short cycle of production

3-2- Current global strategy to increase rice production

- ❖ Creation of an institutional framework that favours synergy of actions between research, supervision of producers and a national development structure;
- ❖ Creation of a co-ordination structure for research at national level : the National Centre for Research in Agriculture ;
- ❖ Close collaboration with regional research organisations: ADRAO- Rice Centre for Africa , African Seed Network (ASN);
- ❖ Support intermediary structures for experimentation and popularisation of rice such as the CBSS

- ❖ Support national production supervision structures: ANADER;
- ❖ Create a national food security committee to sustain and harmonise the different rice production activities;
- ❖ Adoption of the principal of the International Year of Rice (IYR) and ongoing measures for the implementation of a national committee for the organisation of IYR, involving all the participants in the field at national level;
- ❖ Creation of a national management structure for the implementation of all the programmes and projects involved in rice development, with a view to attaining effective self-sufficiency in the medium term: National Rice Programme (PNR) whose director is present at this seminar and who will present a paper in the second part of our contribution, on the organisation he represents as well as its activities.

Seminar on supporting production and dissemination of rice in Africa
(Nairobi 10/11 February 2004)

Part 2
RICE IN THE IVORY COAST: Okou Zago, Director of the National Rice Programme

I- Paddy Production Zones
Being the principal crop produced in the Ivory Coast, rice is cultivated in all part of the country with 600 0000 ha in 2001 where 63% was in the forest zone and 37% in the savannah.

II- Rice Growing in Ivory Coast
2-1 *Cultivation Techniques:* Rice growing is done using traditional farming methods, that is manually, itinerant farming, burning without much land preparation nor use of fertilisers (plateau). Mechanised farming methods are done usingfertilisers on irrigated land.

2-2 *Varieties cultivated in Ivory Coast:* Two types of rice are cultivated in Ivory Coast:

1- Traditional varieties where the most common ones are: Bété, Danané, Digbeugbassou;
2- Improved varieties:

This is done using rainfall and it involves **IDESSA**: IDSA 10; IDSA 6 and **ADRAO:** WAB 56-50; WAB 56-104; NERICA1; NERICA 2
Irrigation farming involving: **IDESSA:** BOUAKE 189 and **ADRAO: WITA** 9, WAB 638-1 (AKADI)

III-Rice Production in the Ivory Coast

3-1 Development of production

The following table explains the development of the production of paddy in the Ivory Coast since 1960.

Quantity (x1000)

Year	1960	1965	1970	1975	1980	1982	1990	1995	2001
Quantity (t)	160	250	316	496	420	540	635	822	940

3-2 Output: The output varies between 0.8 and 2 tonnes per hectare for the plateau rice and 2.5 and 5 tonnes for irrigated rice

IV- THE NATIONAL RICE PROGRAMME AND DEVELOPMENT OF RICE IN IVORY COAST

The National Rice Project (NRP) was created in 1996 in an effort to to reduce the growing importation of rice. It became the National Rice Programme in 2003 and is the specialised structure of the Ministry of State and Ministry of Agriculture governing all the rice farming projects.

The PNR has a seed production centre in Yamoussokro which produced 396.2 tonnes of seed between 1997 and 2002 772.2% of which was NERICA.
More projects are currently ongoing and others whose feasibility studies were completed will be implemented once the current political crisis is over.

4-1 Ongoing Programmes

The programmes and projects that are ongoing are:

- Kennedy Round Two Project (KR2) which consists of donation of agricultural material by Japan to the Ivory Coast,
- Rice Agricultural Centre whose objective is the rehabilitation of 23 dams for a surface area of 1384 ha,
- Hydro-Agricultural Development Project in the N'Zi Valley with the aim of constructing two dams for 330 ha,
- Hydro-Agricultural Development Project at M'Bahiakro to construct a dam and install pumping stations for 400 ha,
- Agricultural Programme PL 480,
- Agricultural Programme KR 2

4-2 Programmes and Projects

4-2-1 Pending projects

I

Development of 600 ha under dams in the Bagoué Valley (Boundiali)

4-2-2 Projects with completed feasibility studies

Development of 1600 ha under dams in the Central-West
Development of 1300 ha in the San-Pédro plain

4-2-3 Projects pending feasibility studies (funding available)

- Development of 2700 ha under dams in the mountain zone
- Development of 2500 ha in the Worodougou region
- Development of 900 ha in the Mahou and Denguélé regions
- Development of 1300 ha in the Bas-Sassandra region (San-Pédro)

2004 100 ha set aside for NERICA seeds.

V – CONTRIBUTION OF PNR IN REDUCING THE EFFECTS OF THE POLITICAL CRISIS

Implementing an urgent programme called “Rice for all” enabled support of rice farming on 14000 ha in the government-controlled zone for free distribution of seed, fertiliser and herbicides.

During harvest, rice farmers were given a discount of 50 kg and 100 kg paddy for plateau rice and lowland rice (bas-fond) respectively.
This collected paddy (about 900 t) is currently being treated to give seed (to make it good for sowing) to be distributed freely to rice farmers in zones formerly occupied at the end of the political crisis.

VI – PARTNERS POSITION

Despite the crisis, Ivorian rice farming has benefited enormously from development partners’ support, notably Japan aid worth 1,285 million fcfa to implement the Rice for all in 2003.
The consolidation and extension of Rice For All to the west and all the savannah zones was also possible thanks to the Japanese financial aid.
The BADEA is currently financing the construction of hydro agricultural infrastructure for the N’Zi project costing 5.5 million

MADAGASCAR

MADAGASCAR REPORT :
CURRENT SITUATION OF RICE - VISION FOR FUTURE DEVELOPMENT

INTRODUCTION

Madagascar is located in the Indian Ocean at the South East of Africa. It presents physical conditions adapted for the rice cultivation but variable according to the regions. There are many vast plains favorable (rice of granary) for irrigated intensive rice cultivation, in which the farmers obtaining a high yield are oriented to the marketing

The rice constitutes the staple food for the most of the Malagasy population as much rural as urban region. So the rice cultivation retains the principal activity in almost of the island, it is practiced by about 1 721 000 farmers. Consequently, the rice circulating contract constitutes the first economic activity of Madagascar. In another way, the performance of rice sector determines mainly the agricultural sector ones, so the national economy ones.

CURRENT SITUATION

1.- Types of rice cultivation :

There are three types of rice production in Madagascar:

- aquatic rice field (81 %): irrigated rice and without water control (2T/ha)
- rain-fed (9%): upland rice with land preparation depending on the pluviometry (1,7T/ha)
- rice cultivation nominated “Tavy” (10%): upland rice with grubbing and burning the forest and depending on the rain (0,8 T/ha).

The ameliorated system (young seedling, fertilization) and the intensive system (baby seedling, water management, frequent weeding) are the most used method in irrigated rice cultivation.

2.- Evolution of area and production (national level):

	1998	1999	2000	2001	2002
Surface (Ha)	1 203 000	1 207 500	1 209 300	1 212 650	1 216 020
Production (T)	2 447 210	2 570 300	2 480 470	2 662 465	2 603 965
Yield (T/Ha)	2,0	2,2	2,1	2,2	2,3

3.- Ameliorated Varieties:

- Irrigated rice: there is about a dozen varieties in which the yield on trial changes from 3,5 T/Ha to 6,5 T/ha.
- Rain-fed: about fifteen varieties with 3,5T/ha to 4,5T/ha on trial.

4.- Situation of NERICA in Madagascar:

Seven varieties are introduced at the beginning of 2002. After sent in quarantine they are in stage of multiplication actually. More technical information will be communicated later.

5.- Analysis of the current situation :

5.1.- *Strong points:* favourable climatic condition, important resource in water, wide available area, existence of high potentiality region, linkage between research and extension service, remission of tax for input (fertilizer, seeds), agricultural material and equipment, potential market for exportation (COMESA).

5.2.- *Weak points:* Natural cataclysm, cricket invasion, environment degradation (erosion, sanding up the rice field, …), lack of infrastructure (road, irrigation channel, …), low yield among the farmers (about 185 000 T of importation) , low income of the rice farmers (no professional, price no instigated, a lot of intermediary), insecurity rural.

6.- Vision for future development:

Within the framework of strategic orientations defined in DSRP (Document of Strategy for Poverty Reduction), the vision will be to ensure a sufficient food availability in all the regions.

6.1.- Global objective: to contribute to food security in all regions, to contribute in improving the economic increase, to ameliorate the income and the life condition of farmers.

6.2.- Considering result: increasing of the area cultivated, improving the yield, involving gradually all the actors (State, Farmers, Organizations, Private sectors) to ameliorate their intervention.

MALI

PROMOTION OF PRODUCTION AND DISSEMINATION OF RICE IN AFRICA

Seminar

10 to 11 February 2004

GENERALITY

In Mali, rice has become more and more important in the eating habits of inhabitants. National production of paddy rice has increased remarkably during the last few years. It is estimated at 952 588 tons. This increase in production is due to the efforts of rehabilitation of the farms and networks of irrigation and to intensification of rice-growing activities, especially in the zone of Niger, and in small irrigated village perimeters. Consumption norm per inhabitant has increased from 40,72 in 1996 to 43,55 kg per year in 2001. The quantity of this production varies according to rice-growing ecologies. This great disparity between rice-growing systems is closely related to mastery of water-use and intensification of farming activities. The levels of intensification determine the type of labour used. That is why in irrigated and marshy rice-growing areas, it is men who are generally the owners of the farms, even though it is women who constitute the greatest part of the labour required.

In the case of rice grown in the marshes, the varieties used are *Khato gaen*, DM 16, *Gambiaka* as well as local varieties, constituted by O. Glaberrima. For irrigated rice, the varieties used are constituted by *Kogoni* 91-1, BG 90-2, *Wassa*, *Sébérang* MR77 and ADNY11.

In pluvial rice-growing areas, where both men and women work side by side, the varieties are: *dususumamalo* (NERICA 4), *sikasoka*, *jigifa*, *kumabani*, *dorado* and the local varieties. As for low-land rice farms, women out number men. Local, improved varieties, like *Shwétassoké*, Mut93, Sik131, BR4 are cultivated.

Type of rice-growing ecology	Varieties	Yield
	Dususumamalo (Nerica 4) *Sikasoka* *Jigifa* Local varieties	800 to 2000 kg/ha 600 to 900 kg/ha
Marshes	*Khao gaen* DM 16 *Gambiaka* Local varieties	800 to 2000 kg/ha 600 to 1200 kg/ha
Low lands	*Shwétassoké* Mut 93 Sik 131 BR4 Local varieties	2500 to 3000 kg/ha 600 to 1200 kg/ha
Irrigated	*Kogoni* 91-1 BG 90-2 *Wassa*	4000 to 6000 kg/ha

Type of system use to produce rice	Area (ha)	Area (%)	Yield Kg/ha	Production (tons)	Production (%)
Total mastery	66 833	14,34	5 306	354 600	49.45
Controlled marshes	120 991	25,97	1 184	143 253	19.98
Small irrigated PPIV village perimeters	11 418	2,45	4 280	48 868	6.81
Rain fed systems (including low lands)	266 656	57,23	693	170 395	23.76
Total/average	465 898	100	1 539	717 116	100.00

Type of rice farm	**Region of rice farm**	**Preparation of the soil**	**Planting**	**Fertilization**	**Type of care to be given**
Low lands	South South-west	Plowing Digging No labour	-Scattered by hand -Placed in the soil	-Light fertilization -Without fertilization	-Weeding
Rain fed	South South-west	Plowing Digging No labour	-Scattered by hand -Placed in the soil	-Light fertilization -Without fertilization	-Weeding -No weeding
Irrigated	South Center North	Plowing Harrowing Digging (hoes)	-Young plants placed in the soil -Planted before germination	Recommended fertilization: 200 urée+100DAP 200 urea+200 *sugubè*	-Weeding required, up to three times
Marshes	Center North	Plowing Digging No labour	-Scattered by hand	-Light fertilization -Without fertilization	-Weeding -No weeding

PERSPECTIVES

To attain self-sufficiency in rice in Mali, the actions carried out must take into account:

- planning and rehabilitation of farms in irrigated and low land rice-growing areas
- intensification of dissemination of NERICA
- backing up activities relative to development of new NERICA genotypes, which are more productive, with complementary technologies
- intensification of seed production

The great demand created by NERICA crop types, and the impetus given to their dissemination, requires a greater involvement of all stake-holders:

- support to organizations of farmers
- capacity building at the level of peasants:
  - training of peasant farmers on complementary technologies (production of seed); on management
  - facilitate acquisition of appropriate material by stake-holders
- setting up appropriate credit facilities
- setting up a system, destined to motivate producers
- setting up a structure, endowed with the necessary mechanisms, that would ensure coordination of dissemination activities and development of research

FINANCIAL SITUATION

- State: All speculations
- World Bank through PASAOP: All speculations
- African Development Bank (ADB): rain fed rice
- Holland: financial support to irrigated rice

NIGER

Republic of Niger
Ministry of Agricultural Development (MAD)

Rice and rice-growing in Niger-Perspectives

In Niger, the rice-growing has known unprecedented growth, for the last two decades. However, its development remains relatively low, compared to other crops. In actual fact, rice makes only 3% of total national cereal production; putting it in third position, after millet and sorghum, which make more than 90%. Consumption of rice per person in Niger went up from 12 kg in 1989 to 17.6 kg in 2002 (*Feasibility survey, PAFRIZ2000*).

Importation of rice (the last 10 years) increased from 39,645 tons in 1995 to about 203,675 tons in 2002, which is estimated at 33 billion CFAS Franks, for the year 2002 (*Feasibility survey, PAFRIZ2000*). National rice production capacity is estimated at 70,000 tons of paddy, both in and out of hydro agricultural producing areas (39 AHA is grown by the State, the total of which is 8,500 ha), of 45 500 tons of transformed rice. This only covers a third of the national average consumption rate, estimated at 15kg/person/annum. Average yield, for the two annual harvests of rice, grown in more than 8000ha, is estimated at 4.5t/ha/campagne/an and the one of the low lands is around one ton per hectare. The varieties of cultivated rice are: IR1529-680-3, BG90-2, D5237, WITA8, and WITA9.

There are three main modes of production of rice in Niger:

- A traditional one (used on low lands) under floods, on the river side or in pools. It is done during the cold season, and it is highly dependent on water level and rains. The area of the farms is about 10.000 ha, with average yield of around 0,7t/ha,
- Irrigated rice, in fields prepared with a lot of skills, in order to control water properly: this is the dominant system today. Although this is the main mode of production, the work is done manually, a part from plowing, done in harnessed areas (use of tractors has been rapidly abandoned). The cultivated areas are around 8.000 ha, and give two harvests par annum – amounting to about 54.000t paddy per year, which makes 83% of the production of the country. Average yield is between 4 and 5t/h
- A small riziculture deprived with pumping individual of balance. It is the most often about small exploitations on summary planning, practicing the rice of hivernage, followed of market gardening or tobacco in dry season. The surface to the total is estimated to 1.500 ha, with middle outputs of 3t/ha.

Perspectives

Of enormous constraints (agronomic, pedological and socioeconomic) are bound to the double culture of rice in Niger. However Niger possesses some assets to develop this culture. One can mention, among others, the existence of an important irrigable potential (270.000 ha, of which 20% are only exploited currently), especially in the valley of the Niger stream, but also close to seasonal rivers, of the permanent pools and semi-perms; the existence of the earths capable to the riziculture 24.000ha); the existence many acquirements of searched for it national and regional (varieties

improved notably of the lineages intra and interspécifigues irrigated estimated in several countries don't Niger, cultural techniques…) and the availability of an important and effective technological potential, don't the transfer to the producers permettraint of important gains of productivity; the possibility of mechanization by the animal traction: the existence of an important and adequate animal potential should permit to solve the problems of traction, of fertilization, of utilisaition rational of the residues of harvest, in short to assure a real integration agriculture and raising; the existence of an available and mobilizable human potential (auto-framing and aware peasants (good mastery of production techniques), formed through various projects of development of a sector deprived with more and more the emergence of big and of means producers…); the existence of walks even satisfied insides, with favorable perspectives of commercialization bound to the presence of some industrial units of transformation (4RINI, SSL); the interest carried by the state to the development of the cultures irrigated rice notably, through the national strategy of development of the irrigation and the collection of the waters of ruissellement (SNDI/CER) as well as the implementation of several programs and projects in the domain of the irrigation (PAFRIZ, PIDM,…).

Partnership - Aid

- ADRAO/WARDA. The association brings its aid regularly (subsidies of sought-after, formation, genetic materials, etc,…).
- Union European-Raise of path rice (PAFRIZ)
- AFD-Realization of amenities (13 billions of F CFA)
- Cooperation Belgian (500 millions of F CFA)

<u>Participating Niger</u>

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NIGERIA

RICE PRODUCTION IN NIGERIA

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Nigeria with a population of 120 million people and a land area of 923,768 square kilometers, has a total of about 73.7 million hectares of cultivable land. Out of this cultivable land, 4.6 million hectares are suitable for rice production (Chaudhary and Nanda, 1986). However, only 1.9 million hectares is currently utilized for rice cultivation, which is under rainfed, irrigated and mangrove swamp conditions. The crop is therefore grown in the humid forest, moist savanna, dry savanna and mid-altitude ecologies. The major production systems are rainfed upland, rainfed lowland, irrigated lowland, deep water swamp and mangrove swamp (Hardcastle 1959, Fagade and Kehinde 1985). These diverse production systems have made it possible to cultivate the crop in virtually all parts of the country.

Today, rice is the fourth major cereal crop grown and consumed in Nigeria after sorghum, millet and maize. It has over the past three decades become a major staple crop for all the teeming population of the country. The current production figure stands at 3.2 million metric tonnes while consumption remains at 5.0 million metric tonnes. With these supply and demand figures, there is a huge shortfall in production, which should call for urgent attention by all stakeholders in rice production in the country. Moreover, rice and its products have the fastest rate of growth in terms of demand compared to other staple food crops in the country and West and Central African sub-region at large.

Rice cultivation started in Nigeria about 3,500 years ago in the Niger Delta region with *Oryza glaberrima*, which is the native species. Its cultivation spread to other parts of the country and up to the 1960s this species remained the dominant variety cultivated. *Oryza sativa*, which has more desirable agronomic characteristics, was introduced into Nigeria in 1892 from Asia. This newly introduced variety has gradually and almostreplaced the indigenous species as their cultivation and demand expanded in the country.

RESEARCH ON RICE IN NIGERIA

Investigations into the improvement of rice cultivation in Nigeria started with the establishment of the Federal Department of Agriculture at Moor Plantation in Ibadan in 1899 by the British colonial administration. This culminated into setting up a Rice Research Station at Badeggi, Niger State in 1953, still under the supervision of the Federal Department of Agriculture, which served as the main Rice Research Station. By 1975 the main Rice research Station metamorphosed into the National Cereals Research Institute with a national mandate to conduct research into the improvement of rice production and some few other cereal crops in the country.

Over these years of investigations into the improvement of rice production in Nigeria, the Station and consequently the Institute along with other stakeholders in rice research and development have developed and selected 54 rice varieties for cultivation in the different agro-ecological zones of the country.These varieties are

selected for the different rice production systems and have potential yields ranging from 2 to 8 tonnes per hectare and maturity periods of 95 – 140 days. Today these varieties have replaced the traditional land races and have tremendously expanded land area put under rice cultivation to about 1.9 million hectares and increased output from 800,000 metric tonnes in 1982 to about 3.2 million metric tonnes in 2000.

During the past 19 to 15 years, some 20 improved rice varieties have dominated rice fields in Nigeria under the different production systems. These are shown in Table 1. The quarters occupied by the different production systems are also highlighted as follows. Rainfed lowland rice production contributes about 45% of rice produced in the country followed by rainfed upland rice – 35%. Others are irrigated lowland rice – 15%, deepwater rice – 4%, and mangrove swamp rice – less than 1%.

Table 1 Trend of Rice Production in Nigeria over the Past Ten Years

S/No.	Production System	Percentage Production	Varieties	Yield per Unit Area	Potential Yield
1	Rainfed upland rice	35%	FARO 43, 45, 46, 48, 49	1.0 t/ha	3.0 t/ha
2.	Rainfed lowland rice	45%	FARO 8, 12 52	1.5 t/ha	5.0 t/ha
3.	Irrigated lowland rice	15%	FARO 29, 35, 37, 44, 50	2.5 t/ha	7.0 t/ha
4.	Deepwater rice	4%	FFARO 4, 6, 7, 14, 15, DA 29, BKN 6986- 7	1.2 t/ha	3.0 t/ha
5.	Mangrove swamp rice	<1%	-	-	-

Among the 54 varieties developed and released there are 2 NERICA varieties. NERICA rice varieties, which have proved to perform satisfactorily under marginal conditions, were introduced into Nigeria some three years ago. Since their introduction, the varieties have been undergoing multi-locational field trials in the different agro-ecological zones of the country. Varieties suitable for the different ecological conditions shall be identified, officially released, multiplied and the certified seeds distributed for sale to farmers in the respective suitable zones. These processes are being carried by the various agencies that are charged with the responsibilities – National Cereals research Institute with field trials for suitability and recommendations for official release; and the National Seed Service with multiplication of foundation seed and production of certified seeds. Others are the ADPs, seed companies and farmers for the multiplication of the certified seeds for distribution/sale to rice farmers. As stated in the opening sentence of this paragraph, two NERICA varieties have undergone extensive field trials in the country and recommended for upland ecologies for cultivation under rainfed conditions. These two varieties were officially released in 2003 and shall undergo extensive multiplication for the production of certified seeds during the 2004 cropping season.

The introduction of the NERICA the varieties is a very welcome development to Nigerian farmers, majority of whom are generally resource poor. Over the past 10 –15 years, prices of agricultural inputs have escalated to a level that most peasant farmers can not afford them. Fertilizer prices have gone up between 1990 and 2003 by 300 – 400%; herbicides by about 200 – 250%; and land preparation and clearing machines by about 700 – 900%. Such astronomical increases in prices of inputs coupled with that of labour force in the agricultural sub-sector has made agricultural production in

Nigeria almost unprofitable. NERICA rice varieties have therefore come with a very big relieve to rice farmers and farmers of other crops are looking forward for their own miracle crops.

GOVERNMENT POLICIES IMPACTING ON RICE PRODUCTION

Although agricultural research improvement is a major intervention in the growth of agricultural production, the Nigerian government did not stop at promoting research alone. The government made other notable deliberate efforts to enhance agricultural production in general and rice production, processing and marketing in particular. These interventions include:

i) the National Accelerated Food Production Programme (NAFPP) – 1972;
ii) River Basin Development Authorities (RBDAs) – 1975;
iii) Operation Feed the Nation (OFN) – 1976;
iv) Green Revolution (GR) – 1980;
v) Agricultural Development Projects (ADPs) – 1984;
vi) Directorate of Food and Feeder Roads Infrastructure (DFFRI) – 1987;
vii) National Agricultural Land Development Agency (NALDA) – 1992;
viii) National Agricultural Research Project (NARP) – 1993;
ix) Japanese government assisted Special Rice Project (SRP) – 1998;
x) Special Programme for Food Security (SPFS) – 2001;
xi) Presidential Initiative on Rice Production and Export - 2001.

Other policies put in place to promote rice production in the country include the temporary ban on the importation of rice in 1985; Structural Adjustment Programme (SAP) in 1986; and subsidy and concessional duties on importation of farm inputs and machinery. Others are the exemption of a number of agricultural goods from Value Added Tax (VAT); and tax exemption on bank loans to agricultural trade and businesses.

However, despite the fact that each of these programmes was good in its own context, the problems of rice production, processing, marketing and distribution were not addressed in a holistic manner. This failure resulted in the local rice not meeting standards of imported rice bringing about the low take up of locally produced rice and consequently low prices. All these have led to Nigeria, which was self sufficient in rice production in the 1960s, being a massive importer of rice in the sub-region. Today, although about 50% of rice produced in the ECOWAS countries is grown in Nigeria, but yet over 50% of rice imported into the sub-region (2.4 million metric tonnes) comes to Nigeria.

CONSTRAINTS

Now the big question is that despite all the efforts made by the federal, state and local governments to boost rice production and become self sufficient, why is there still a big supply – demand gap in the country? The reasons for this are numerous. First, agricultural production in Nigeria is generally characterised by small farm holdings of between 0.5 – 1.5 hectares. Majority of the farmers are subsistence farmers who have limited access to modern agricultural production information and technology. They either have no resources to procure the necessary inputs or they do not know where to obtain them. These result in low productivity and low output.

Secondly, the procurement and distribution of vital agricultural inputs like seeds, fertilizers, pesticides and agricultural machines are characterised with abused by the operators and or officials. At the end, benefit from government gestures through subsidies and other forms of assistance, do not get to the farmers. The farmers thus remain at the same level. Further to this, when the government wanted to hands-off procurement and distribution of fertilizers in 1997, the private sector abused the privilege by adulterating what goes to the farmers. This attempt acquired that dimension however, because no functional government machinery was put in place to check the excesses of the private sector. All these are in spite of the exorbitant prices and non-availability of the inputs at the right times.

Thirdly, there exists the inadequacy of extension services who should provide the farmers with the necessary information and where and when to procure the necessary inputs. When the extension system in the country was properly supported in the 1980s and early 1990s through the assistance of the World Bank (through the state-wide ADPs), there were no improved technologies to transfer because the technology generating agencies were neglected. The reverse occurred in the 1990s when technology generation was promoted by which time the resources for the ADPs was exhausted and could not carry out their statutory responsibilities.

Fourthly, with the advent of the oil boom in Nigeria, there was a serious rural-urban drift especially in the 1980s. The young and energetic components of the farming communities abandoned the rural areas and migrated to urban centers to look for white-collar jobs. This situation left only the aged population who could not produce enough food for the fast growing population of the nation. The aged were also more difficult to convince to change from traditional to modern production practices.

Five, it has been observed over the years that despite the little growth recorded in agricultural production and in rice particularly, the food deficit of the nation is always on the increase. The rapid population growth always swallows it up because it grows faster than agricultural growth. The rate of agricultural production growth should therefor be increased to keep pace the rate of population growth in order to take Nigeria out of the perpetual food deficit situation.

Finally, there is the inconsistency of government policies on agriculture generally which adversely affect rice production. During the military regime, every new government that came into power abolished most existing developmental structures and established new ones. These new ones would not yield result before another government comes in to abolish them. This has been the trend since the 1960s when the military took over affairs of running Nigeria. However, some consistencies have been observed since the present administration took over in 1999 and we hope it shall continue.

WAY FORWARD

Considering the circumstances surrounding rice production and consumption in Nigeria, there is an urgent need to adopt some measures that would promote rice cultivation especially the NERICA varieties. All stakeholders in the research and development of rice in the country should put hands together to work towards attaining one goal, self-sufficiency in rice production. The present administration has

already taken step in the right direction by inaugurating the Presidential Initiative on Rice Production and Export in 2001. Bur to achieve the desired objectives, certain fundamental issues have to be tackled. These include a) increasing the productivity of the small holder farmers; b) encouraging the establishment of large scale mechanised rice farms; and c) improving on the processing of locally produced rice.

Over 70% of the Nigerian population is engaged in agricultural production. Despite this huge number, the nation still remains a net importer of food stuff. This is because of the subsistence nature of the production practices with consequent low productivity and low output. In view of this, the low productivity of the small holder farmers must be enhanced in order to increase agricultural output. This can be achieved by improving on extension delivery systems, making available the necessary agricultural input at the right times; guaranteeing soft loans for agricultural (rice) production; and improving on market infrastructures.

With the continuous migration of the youth from the rural to urban centers, the aged population in the rural settings may not be able to support the level of production to adequately feed the nation. The establishment of large scale mechanised farms by private companies and wealthy individuals would need to be encouraged. One single such farm that is well managed could produce more than hundreds of small holder farmers.

To provide for an incentive for rice farmers, the prices of their produce must be comparable to the imported ones. So far, the rice varieties grown by most Nigeria farmers today are favourably comparable to all the varieties of imported rice. The only difference lies in the processing. The Nigerian Rice Farmers Association, community-based organizations and other organised farmers' groups should be advised and encouraged to set up small and medium scale rice processing plants amongst rice growing communities. Local governments could be mandated to support such ventures technically in advisory capacity.

CONCLUSION

In conclusion, Nigeria with its fast growing demand rate for rice and abundant natural and human resources to produce enough rice for the entire ECOWAS sub-region, should look inward to enhancing its rice production rather than importing to meet demand. The resources are there, it is only the will that is lacking.

AFRICAN RICE INITIATIVE (ARI)

The African Rice Initiative (ARI) is a multi-donour supported consortium and network. It was launched on 27th March 2002. A full time co-ordinator arrived WARDA on 1st July 2003. Rockefeller Foundation started funding the consortium/network during the last quarter of 2002. The AVRDC rice-based vegetable research and development project will start releasing its fund in 2004.

ARI was established in order to promote widespread diffusion of NERICA rice varieties and complementary technologies in sub-Saharan Africa and to serve as a vehicle for an extended partnership amongst rice development stakeholders, policy makers and donours.

SENEGAL

REPUBLIC OF SENEGAL
One people- One goal- One faith

MINISTRY OF AGRICULTURE AND WATER

ISRA

Senegalese Agricultural Research Institute

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PROJECT FOR THE IMPROVEMENT OF RICE PRODUCTION THROUGH THE DISSEMINATION OF NERICA VARIETIES

October, 2003

PROJECT FOR THE IMPROVEMENT OF RICE PRODUCTION THROUGH THE DISSEMINATION OF NERICA VARIETIES

I. INTRODUCTION

Since Senegal attained sovereignty, it has strived, with the help of its development partners, to implement agricultural policies that are adjusted periodically in light of lessons learnt. The priority given to the agricultural sector is justified in part by the great potential in natural resources (soils, surface and underground waters and the fact that it occupies close to 60% of the active population).

It must be admitted that despite heavy investments and facilitation made to improve conditions of production, the sector has registered cyclic growth, even leading to crises in the past two decades; thus the rate of self-sufficiency in food dropped from 70% in 1963 to 53% in 1995 (ISRA, (1998).

In order to turn this trend around and given the imperatives of structural adjustment, the Senegalese government prepared an Agricultural Policy Declaration Letter (APDL) accompanied by two key programmes, namely:

- Agricultural Sector Adjustment Programme (PASA) from 1992 to 1996.
- Agricultural Sector Investment Programme (ASIP) whose implementation is underway with a section on "revival of the Agricultural Sector"

The section on the revival of agricultural production revolves around five fundamental points:

1) Introduction of high performance varieties with a view to expanding the genetic base of the variety range and increasing production security;
2) Reconstruction of seed capital as a result of an effort to produce selected seed through ISRA (pre-foundation seed production), private producers, village groups and associations (CBSS application), and the Seed Division of the Board of Agriculture (seed produce control and certification);
3) Funding for the rural areas either through the annual agricultural programme (with the Agricultural Credit Bank as project manager) or through some credit lines that exist within certain projects such as the Agricultural Modernization and Intensification Project (PMIA) or insurance companies/mutual benefit societies;
4) Strengthening producer organizations and local groups' capacity to enable them be accountable;
5) Creation of favorable conditions for the emergence of a dynamic private sector that is committed to development.

This is why ISRA, in order to fulfill its upward task of seed production, has strengthened its operational mechanism by creating a unit called ISRA/Productions responsible for seed, plant and vaccine production and also by having support structures in ISRA regional centres.

II. TERMS OF REFERENCE OF THE PROJECT

II-1. JUSTIFICATION

Senegal imports large quantities of rice, which weighs heavily in its trade balance. Its rice imports amount to 600,000 tons against a national production of about 200,000 tons. Therefore Senegal hardly meets 33% of its domestic need in rice, and yet large areas of Senegal's territory is suitable for rice farming. This is partly due to inadequate use of varieties with high yielding potential whose availability in seed is a prerequisite for a significant growth in production.

Consequently, the submitted project envisages the creation of favorable conditions for the improvement of rice production through testing and dissemination of better varieties, the production, in sufficient quantities, of quality seeds, training of producers and improvement of existing infrastructure.

Moreover, in irrigated zones, agronomical performance testing of NERICA varieties is underway: (cross-breeding *Oryza, Glabberina* and *Oryza Sativa* type *Indica*), in collaboration with ADRAO (Irrigated rice programme). This pace should be maintained and increased in the context of this project in order to have certified varieties within a year or two ready for dissemination to the producers.

II–2. PROJECT OBJECTIVES

The principal objective of this project is to increase rice production in Senegal.

The specific objectives of the project are to :

1. Identify, validate, and disseminate the best varieties of NERICA to the producers;
2. Produce pre-foundation and foundation seeds in sufficient quantities;
3. Allow for long conservation of the produced pre-foundation and foundation seeds;
4. Improve working conditions for ISRA departments involved in the project so as to facilitate the production of good quality rice seeds in sufficient quantities;
5. Create favorable conditions for holding training sessions for producers, private seed producers and staff.

In detail, this project is intended to achieve the following results:

1. **Service production capacity in the field of seed production and conservation is strengthened through:**
    - Establishment and equipment of three (3) irrigated farms: two of 15 hectares (Kédougou and Toubacouta) and one of 10 hectares in Fanaye.
    - Construction of storage chambers (cold storage and air conditioned stores) and drying and threshing areas;
    - Construction of a packaging unit on each farm with all the facilities for the post-harvesting techniques of rice seeds;
    - Equipment of offices and laboratories;
    - Provision of logistical resources (vehicles, motorcycles), computers and office furniture.

2. **The basic actors are better trained, better organized and are becoming true entrepreneurs thanks to institutional capacity building; their organization through viable associative structures prepares them for self-management and to better negotiate their interests with governmental or private structures. These results are brought about by:**

    - Construction of infrastructure for receiving and training producers;
    - Equipment of the training centers with educational and teaching as well as communication materials.

3. **The demand for pre-foundation NERICA seeds throughout the country is satisfied through the enlargement of the variety range and the increase of pre-foundation product quantities.**

4. **A procedural information system is put in place to assist the decision makers and actors on the ground.**

5. **Intervention programmes aimed at developing the entire seed network are prepared and implemented with better efficiency (better coordination and development of synergies in the different interventions).**

The details of infrastructure, material, vehicle pool required by ISRA is given in annex.

III. USE OF DESIRED INFRASTRUCTURES AND MATERIALS

The infrastructures, materials and equipment asked for by ISRA should help the institution to improve the quality of services provided and therefore contribute with time towards constituting a national seed capital including the new and older varieties of rice.

The three irrigated farms envisaged will enable ISRA to guard against the vagaries of seed production in rainwater and achieve two annual production seasons (the rainy season and dry season).

Acquisition of the production materials, scientific laboratory and packaging equipment (production chain) will enable ISRA to:

- To perform better
- To invest in service providing activities (post-harvest processing and packaging) for the benefit of providers and private seed producers (the revenue generated in service provision should contribute to meet part of the cost of the structures).
- Hold training sessions in production and quality control techniques of rice seeds for Senegalese and other trainees from the West African sub region.

With regard to the vehicles, renewing them will improve conditions of mobility for ISRA staff during its supervision, control, seed production and harvest and fertilizer transportation trips.

IV. PROJECT IMPLEMENTATION METHODOLOGY

The project shall be implemented on three farms: Fanaye, Kédougou and Toubacouta. The NERICA varieties that come directly from ADRAO and the G1 pre-foundation seeds will be maintained in Fanaye. That is to say that Fanaye will serve as nurseries for the introduced NERICA varieties. These will in turn be used in adaptability and rainfed variety evaluation trials, in Kédougou station (medium and long cycle varieties) and in Toubacouta (short cycle varieties). Multiplication of G2 foundation seeds will also be done in these stations and these will be used for the production of certified seeds on farmers' fields (implementation of the CBSS). After the variety evaluation trials at the stations, demonstration field trials will be carried out in the villages to give farmers the opportunity to choose their varieties for multiplication. The working calendar will be established as follows:

- **Year 1**: In the dry season: investments, equipments and infrastructures; in the rainy season; receiving of the varieties and multiplication of seeds in Fanaye, finalizing the installation of the Kédougou and Toubacouta stations.
- **Year 2**: Rainfed variety evaluation trials in Kédougou and Toubacouta
- **Year 3**: 2nd year of variety evaluation trials, 1st year of demonstration field trials of the highest yielding varieties, multiplication of the same GI foundation varieties in Fanaye. Training sessions for producers on seed production and conservation.
- **Year 4**: 3rd year of rainfed variety evaluation trial and 2nd year of demonstration field trials (selection of varieties by the farmers) and production of the highest yielding G2 foundation varieties in the Kédougou and Toubacouta stations.
- **Year 5**: Multiplication of certified seed varieties selected by the farmers on their land for dissemination among rural communities. Training sessions for producers on seed production and conservation, under supervision, on selected sites. A maximum of four varieties shall be disseminated in each village. As much as possible, not more than two varieties will be disseminated in one type of rice growing method per zone.

V. ESTIMATED COST OF THE PROJECT

The revised estimated cost of the project is **2,073,648,000 CFA F which is equivalent to 414, 729,600 Japanese ¥. 1CFA F = 0.20 Yen**.

APPLICATION FORMS FOR A DONATION FROM JAPAN

1. The ISRA Seed Production Unit (ISPU)

Applicant country :	REPUBLIC OF SENEGAL
Name of Project :	Project for the improvement of rice production through the dissemination of NERICA varieties.
Sector :	Agriculture
Type of Project :	Dissemination of new rice varieties and seed production.
Total cost of the project :	**2,073,648,000 CFA F** **OR** **414,729,600 Japanese Yen**
Ministry in charge :	Ministry of Agriculture and Water
Implementing Agency :	Senegalese Agricultural Research Institute (**ISRA**)

I. PROJECT DESCRIPTION

1. Background (please give details)

（1） Current situation of the sector

In Senegal, Agriculture is characterized by two traditional crops; millet and ground nuts covering close to 80% of farmland. The main cereals are millet, sorghum and rice. Rice occupies a very important place in the Senegalese diet. However, the national production of about 200,000 tons falls far below the annual demand estimated at 600,000 tons. Consequently, Senegal has to import the shortfall. Rice constitutes 70% of Senegal's imports (M.A, 1999).

（2） Problems in the sector that need to be resolved

Improvement of rice production by farmers constitutes the main problem that needs to be solved. Among the possible solutions, the availability to farmers of new rice varieties that are better adapted to the farming conditions and yielding better quality grains could be retained. These strategies would be implemented through the use of NERICA rainfed varieties which do very well in the countries of the sub region (Guinea, Côte d'Ivoire).

（3） The need for and advantage of improving the sector

Improvement of the sector will increase productivity, contribute to food self-sufficiency and poverty reduction in rural areas, reduce rice imports and save some of the foreign currency that the country is in dire need of.

（4） Circumstances of preparation of the Project

The continued increase in demand for rice by far surpasses the national supply which does not meet the needs, while it is possible to improve the situation significantly by taking advantage of the progress in the agricultural research in Senegal and the sub region and by strengthening the technical and organizational capacity of the producers.

ISRA produces pre-foundation seeds from which foundation and certified seeds are produced.

Production of pre-basic seeds constitutes one of the key missions of the State. The State then passed on this mission to ISRA, which, despite the economic difficulties it is facing, is doing its best to fulfill it. In addition, ISRA must also train its staff, particularly in the field of seed technologies. For all the above reasons, ISRA needs the necessary infrastructures to meet these demands; moreover it has become indispensable to replace the current obsolete materials that are no longer adapted to the present production and conservation conditions of quality seeds.

2. Objectives and content of the Project

(1) Objectives of the Project

(i) Short term objectives

- Increase rice production in Senegal
- Strengthen production capacity of farmers
- Improve the quality of pre-foundation seeds provided by ISRA
- Provide ISRA with the infrastructures and equipment necessary for seed production
- Train stakeholders in rice production techniques and provide them with organisational support
- Reduce poverty in the rural areas.

(ii) Medium and long term objectives

- Disseminate NERICA varieties throughout the country
- Train producers in quality seed production
- Guarantee the continuity of plant genetic resources, particularly rice.

(iii) Describe clearly the relationship between the Project and its objectives, that is, how to realize the Project and attain its objectives.

a) Introduction and testing of NERICA varieties

Available varieties for the different ecological conditions (rainfed, lowland, irrigated) will undergo adaptability and production stability tests in collaboration with the farmers. These tests will be conducted in representative villages (5–10) over (2 – 3) years. In each village, 1 – 3 farmers will be involved in the experiment. Every year, field tours will be organized with the objective of receiving the reactions of producers from each village about different varieties. Varieties selected by the farmers will undergo extensive field trials in readiness for certification.

b) Pre-foundation and foundation seed production

Once the varieties are certified, ISRA will conduct multiplication exercises resulting in different levels of G1, G2 pre-foundation seeds. From the G2, the seeds are supplied to trained and approved producers for the production of foundation and certified seeds. The village communities will be involved at this stage.

c) Training and supervision in seed production

Availability and periodic renewal of quality seeds is a prerequisite to a sustainable use of the new improved varieties. In most cases the producers are almost always confronted with the problem of availability and accessibility of quality seeds. It is important to train and supervise leading producers in seed production. This training in theory and practice will be done in field-schools.

After training, the producers will be supervised during the production of new seed varieties (foundation and certified) that will be in demand.

ISRA has competent staff for the production of quality seeds in sufficient quantities. The availability to the staff of production and quality control equipment will enable them to achieve the quantitative and qualitative objectives.

(2) Project contents (Describe in great detail the characteristics of the installations and the specifications of the equipments)

The equipment and materials requested for will be housed in identified locations but will remain available on demand to the different Project implementing teams. These can be summarized as follows for the different stations:

(i) On Kédougou station

Activities :

- Preparation of 15 hectares for irrigation by sprinkling for the rainfed highland rice varieties;
- Construction of a 360m² chamber for seed storage, conservation and pacjaging;
- Construction of temporary stores (depots);

- Installation of a packaging unit (sorting-grading-processing-drying-weighing) and agricultural materials;
- Construction of a threshing and drying area;
- Laboratory analysis equipment will be provided;
- Different equipments necessary for production will be provided;
- Acquisition of a generator;
- Acquisition of a 4x4 Pick up;

(ii) On the Toubacouta station

The activities will be:

- Preparation of a new 15 hectare station (sprinkling irrigation network);
- Establishment of a drilling machine and preparation of an irrigation basin;
- Construction of store, offices;
- Construction of temporary stores;
- Construction of a threshing and drying area;
- Supply of agricultural materials;
- Supply of different equipments necessary for production;
- Acquisition of a 4x4 Pick up;
- Acquisition of three motorbikes.

(iii) On the Fanaye station:

- Rehabilitation of irrigation canals;
- Preparation of rice fields on 10 hectares;
- Acquisition of a 4x4 Pick up;
- Improvement of the pumping system;
- Rehabilitation of the reception area;
- Construction of a store;
- Rehabilitation of a cold store;
- Supply of agricultural (tractors and equipment) and transport (track and lorry) materials.

(iv) On Bambey center:

- A liaison vehicle;
- A 4x4 Pick up;
- A bus for providing transport during training sessions;
- Rehabilitation of the reception area and the training room;

- Acquisition of laboratory equipments;
- Acquisition of educational and communication equipments.

(v) On Toubacouta center

- Acquisition of office equipments
- Acquisition of a 4x4 station wagon vehicle;
- Equipments for cold storage;
- Laboratory equipments.

(3) Location plan for the equipments and materials

The equipment will be installed in Kédougou, Toubacouta, Fanaye and Bambey

(4) Estimated costs (give details of all the indicators on which the estimated costs are based, such as the inflation rate, exchange rate, unitary prices, etc… Attach tables of estimated costs per plant and equipment item. If estimates are given in local currency indicate the exchange rate against the American Dollar or the Japanese Yen).

The cost of the Project is estimated at approximately:

1. Kédougou	425,000,000 CFA F
2. Fanaya (Saint Louis)	488,100,000 CFA F
3. Tambacounda (south Tambacounda)	188,500,000 CFA F
4. Toubacouta	405,900,000 CFA F
5. Bambey	566,148,000 CFA F
Grand total:	**2,073,648,000 CFA F**
	OR
	414,729,600 Japanese Yen

Details of the costs are found in annex.

3. Impact and benefit to the people from presentation of this Project

(1) People benefiting directly from the Project

- Rice farmers from the target zones will have different high yielding varieties at their disposal (women from the target zones will constitute the main beneficiaries of the Project)

- Structures responsible for production of foundation and certified seeds will get a solution to their supply problem through the improved availability of pre-foundation seeds.

- Researchers will access quality seeds for trials.

- Producers will be trained in seed production techniques.

(2) People benefiting indirectly from the Project

The authorities will realize a decrease in imports.

All Senegalese and possibly sub regional producers will benefit from the improvement in quality of the NERICA rice seeds for future multiplication.

Rice consumers will have a bigger choice for their food.

(3) Region benefiting from the Project

The entire country will benefit from the introduction of new rice varieties as well as some of the countries in the sub region that have similar climatic conditions as Senegal and wish to emulate Senegal's example.

(4) Economic and social value of the Project (Please describe them clearly)

(i) Current situation (before implementation of the Project)

- Too much dependence on imported rice in the country;
- Poor productivity using traditional rice farming methods;
- Non participation of producers in the process of seed production;
- Poor participation of producers in introduction trials for new seed varieties;
- Obsolete and/or insufficiency in capacity and quantity of seed research, production and conservation equipments.

(ii) Expected impact of the Project (after the implementation of the Project)

- Reduced rice imports by the country;
- Improved rice productivity;
- New varieties available to producers;
- Increased amounts of seeds available;
- Improved quality of the seeds available to producers;
- Rise in the level of technical knowledge among the producer groups and the technicians supervising them;
- Active participation of producers in the seed production process.

(5) The impact of presenting the Project on the people: (Describe how the people will observe and recognize the benefit or the value of the Project in the form of a Japanese Grant/Donation when it is completed).

Information will be given to the Senegalese public on the nature, origin and use of the Grant at an official ceremony presided by Senegalese authorities in the presence of State and private press. A commemorative plaque will also be unveiled. The same information will be provided during feedback sessions to be organized regularly with all the stakeholders in attendance during the implementation of the Project. A closing seminar will review progress made and will be highly publicized in the media. Films, billboards and posters will be made to publicize the achievements of the Project.

4. Request to the donors

(1) Was any other request linked in any way to the present one presented to other donors ?

1. Yes **2. No**

(2) If so, answer the following questions:

(i) Name of donors; Rockefeller Foundation

(ii) Title and overview of the proposal; Project for the improvement of rice production in Casamance

(iii) **Possibility of a positive response from the donor** ; The dossier was submitted through the official channels in 2002. Response from the donor is awaited.

(iv) In case the other donors do not give assistance, explain clearly the applicability and the validity of the Project;

(v) In case the other donors give a loan, clearly explain why the Project must be implemented in the form of a Grant : What has been requested from the Rockefeller Foundation is quite modest and is limited to the Tambacounda region, while the Project for the dissemination of NERICA varieties should cover at least three regions in Senegal and impact a much greater number of producers. Moreover, the NERICA production conditions are accessible to a greater population working mainly in the rainfed zones that cover most of the farmers, rice fields.

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5. Priority

(Clearly explain why the Project should be given priority out of the projects proposed to Japan).

The urgency of this Project is linked to its importance:

- It will contribute significantly to an increase in rice production through availing new, high yielding varieties and quality seeds and by reducing the country's dependency on imported rice.

- By training technicians and seed producers it will give them greater independence and strengthen their capacity to play their role more fully within the network.

(Attach a list of projects arranged according to their priority)

6. Ministry and Agency responsible for the Project

MINISTRY OF AGRICULTURE AND WATER

(1) Implementing Agency's profile (containing all details)

SENEGALESE AGRICULTURAL RESEARCH INSTITUTE

(i) Organizational chart of the entire agency

(Indicate the department and the office in charge of the Project)

The ISRA/Production unit, through the Cereal and Vegetaable Seed Production Department (SPSCL) based in the National Research Centre in Bambey, with intervention points throughout the national territory (Thiès, Saint-Louis, Tambacounda, Fatick), will be responsible for the Project.

(ii) The agency's duties and competence

- Production of sufficient quality pre-foundation and foundation seeds to meet the demands of research units and private seed producers;

- Preparation, in collaboration with the other units, of technical references for the production, packaging, conservation and protection of seeds on the one hand, and on the other, preparation of a technical itinerary for optimizing seed production costs;

- Improvement of the know-how of ISRA researchers and technicians ; Develop training modules on seed technology and technical assistance for seed producers.

(iii) Staffing (staff numbers, employees of the agency, the department and the office in charge of the Project).

Implementing agency ISRA :

The Senegalese Agricultural Research Institute has a total of 486 members of staff, 120 of whom are researchers, 28 assistants, 50 administrative and technical staff, 288 administrative, scientific and technical support staff, deployed in 5 research departments (agriculture, forestry, livestock, fisheries and economic),

The Cereal, and Vegetable Seed Production Department (SPSCL) has 20 members of staff, 13 of whom are on permanent basis, (rice agronomist, selector and technical cadre) 3 on contract and 4 on temporary basis;

(iv) The budget (revenue and expenditure): Where figures are given in local currency, please indicate the exchange rate against the American Dollar or the Japanese Yen)

(2) Profile of the Ministry in charge (give details)

MINISTRY OF AGRICULTURE AND WATER

The Minister for Agriculture and Water is in charge of the implementing of the agricultural policies of the Senegalese Government.

Placed under the authority of Prime Minister, the Minister's mission is to promote sustainable agricultural development with a view to guaranteeing food security and improving rural populations' standard of living. In this regard:

- He prepares and implements policies approved by the head of State in the agricultural sector.
- He coordinates, follows up and evaluates the implementation of policies, programmes and projects and actions related to:
  - Supervision and training of producers
  - Rural and Agricultural administrative boards
  - Increasing and diversification of agricultural production
  - Plant protection
  - Agricultural water installations, infrastructures and rural equipment
  - Applied research in agricultural subjects
  - Professional agricultural training.

In this regard, he manages and controls the activities of the central, regional, district and local departments placed under his authority with a view to accomplishing the mission of agricultural development.

(i) The organizational chart of the ministry concerned

In addition to being a member of the Cabinet and supervising the departments attached to the central Administration, the Ministry of Agriculture and Water comprises:

- Board of General Administration (DAGE)
- Board of Analysis, Foresight and Statistics (DAP)
- Board of Agriculture
- Water Board
- Board of Water Harvesting Basins

- Horticultural Board
- Plant Protection Board
- Rural Engineering Board
- Regional Rural Development Boards and
- Rural Development Services Board

Public institutions including:

-ISRA, a scientific and technological public institution under the Minstry of Agriculture and Water

-The SAED (Delta Development company)

-The SONACOS (National Company for the Commercialization of Senegalese Oil-seeds).

The following establishments are attached to the Cabinet:

The Inspectorate of the Ministry of Agriculture

The Agricultural Professional Training Office

Agricultural Legislation Office

Press and Information Office

National Committee for the Inter-State Committee on the Fight against Drought in the Sahel (CONACILSS)

(Indicate the department and the office in charge of the Project and the implementing agency)

ISRA/Production is the implementing agency through its cereal and vegetable seed production department.

(Attach a detailed organizational chart indicating the department, office and section in charge of this Project and the implementing agency).

ISRA ORGANISATIONAL STRUCTURE

BOARD OF DIRECTORS

MANAGEMENT COMMITTEE | SCIENTIFIC AND TECHNICAL COMMITTEE

MANAGEMENT

INTERNAL AUDIT | MANAGEMENT CONTROL

ISRA PRODUCTIONS | RESEARCH OFFICE

GENERAL SECRETARIAT | SCIENTIFIC BOARD | ACCOUNTS

TECHNICAL SUPPORT		HUMAN RESOURCES		BAME		UNIVAL	ACCOUNTS DEPT

ADMINISTRATIVE SUPPORT		COMPUTER MANAGMT UNIT		NATIONAL CENTRES		REGIONAL CENTRES	FINANCE DEPT

LNERV		BAMBEY		SAINTLOUIS

CNRF		DJIBELOR		KOLDA
CRODT		DAHRA		CDH
LNRPV				

(ii) Ministry's duties and competence

The Ministry of Agriculture and Water's mission is to promote sustainable agricultural development with a view to guaranteeing food security and improving rural populations' standard of living.

(iii) Staff (staff numbers, employees of the agency, the department and the office in charge of the Project).

(iv) The budget (revenue and expenditure): Where figures are given in local currency, please indicate the exchange rate against the American Dollar or the Japanese Yen)

7. Preparation

(1) Location of the Project (Attach photographs and geographical plans
(eg.1: 100,000 that clearly describe the location)

(i) a) Site location
Thiès region (Bambey)
Tambacounda region (Kédougou)
Fatick region (Niombato, Toubacouta, Nemaba) and
Saint-Louis region (Fanaye)

b) Site address: ISRA/SPSCL/CNRA/Bambey BP 53

c) Surface area of the site: Bambey 650 ha, Fanaye 40 ha)

(ii) Ground preparation

a) Who does the land belong to?
Bambey and Fanaye stations belong to ISRA. However, productive areas will be used for the Project

b) Need for purchase
Non

(Attach purchase regulations)

(2) Electricity, telephone, drinking and waste water, and other facilities)
(Describe the possibilities of using the facilities mentioned above)

Electricity, telephone and clean water are available in Bambey, Kédougou and Tambacounda; Fanaye, Toubacouta will have to obtain an electric generator to provide electricity. All the stations will have to obtain telephone facilities.

(3) Is there other information, statistics, or data concerning the geographical, geological, meteorological or oceanographical conditions etc ? YES, if required.

(If there are any , please attach details)

8. Implementing agent's capability
(Describe the agency's ability to manage, sustain and monitor the Project)

(1) The current situation

The unit has competent staff in seed production technology and researchers on seed quality. It has qualified researchers specialized in variety selection, 3 of whom hold a PhD, 3 hold a M.A. in Science, in Plant Biology, Agronomy, seed technology, top level technicians, administrative officers and accountants. It can also access the skills in different fields existing in other ISRA centres: rural economics and sociology, agronomy, post-harvest technology, agro-climatology, soil pedology and fertility as well as biometrics and SIG. In addition more technical officers and technicians can also be mobilized within the context of Project implementation.

(2) Problems related to the Agency's capabilities: Quality and/or inadequacy in capacity and quality of research equipment and seed production

The unit has equipment and materials for seed production activities, but they are dilapidated and not enough. Moreover their makes are so old they are no longer available on the market. Production materials are not always available to the Agency due to high demand by all the potential users.

The Agency also has a guest house for visitors on study tours, but also for training seminars for producers. However, the center needs repair and a change of furniture. There is a training room but it also needs repair and equipment.

(3) Problem of Agency reform (If any, clearly describe the reform programme content which enables the Agency to manage the Project better).

9. Project operation and management
(1) Staff (numbers) : 14 people

Current situation	**after the realization of the Project**
14 persons	14 persons

Ministry in charge : Ministry of Agriculture and Water

Implementing Agency : Senegalese Agricultural Research Institute

Staff in charge of the Project : A coordinator and his team

(In case of a Project related to hospitals, research institutes, training centres, attach a table showing staff deployment)

(Where essential staff is not yet adequate, when and where are they trained ?

(2) Budget (Fill the table below)

(Where figures are given in local currency, please indicate the exchange rate of the American dollar or the Japanese Yen).

2 years before (2000)	**1 year** before (2001)	**this year** (2002)	**project will begin (2003**)

Ministry in charge : Ministry of Agriculture and Water

Implementing Agency : ISRA

Operating budget : 2,073,648,000 CFA F OR 414,729,600 ¥

Exchange rate – 0.2¥ for 1 CFA F

(Where an additional budget is necessary for the implementation of this Project, please answer the following questions)

Has the additional budget already been received?

1. Yes 2. No

(3) Technical level of local staff

The researchers all hold a PhD or Master of Science, the technicians an Advanced or an Ordinary-Level with more than 10 years experience in seed production and supervision of producers.

(i) Describe the technical level of the local staff in relation to the Project

3 officers hold a PhD in variety selection, or a Master of sciences in seed technology
1 Plant-pathologist specialized in seeds
2 Agronomists
2 Pedologists
1 Genetician
1 Post Harvest Technologist.

(ii) Clearly describe the technical or academic careers of the local staff who will be responsible for running and maintaining machinery and equipment in the Project.

2 PhDs in variety selection
1 Master of Sciences in seed technology
1 Seed Plant-pathologist
2 Agronomists
I Pedologist
1 Senior Technician in seed technology
1 Senior technician in cooling and electricity
3 Technicians in seed technology

10. List other projects in the same sector

(If there are other projects planned for by other donors in the same sector please list them)

(1) Donor country or international organization: Rockefeller Foundation

(2) Project Title: Improvement of rice production in the Casamance

(3) Project Overview:

Recent progress made on the subject of selection (inter-specific cross-breeding between *Oryza Sativa of Asian origin* and *Oryza Glabberima,* of African origin) through the new rice for Africa (NERICA) opens interesting perspectives for a substantial improvement of rice production in the poor input systems which characterize traditional rice farming in countries of the South.

The present project intends to remove the constraints that limit performance of the mangrove swamp rice and the rainfed lowland rice in Casamance.

(4) Type of funding

(Grant, loan, technical assistance etc…)

(5) Project life span

3 years

(6) Relationship with the present Project

The two projects are complementary

(Where there are many projects please attach the list of Projects)

11. Technical assistance

(1) Is any technical assistance expected for the present Project ?

i. Yes ii. No

(2) Is some technical assistance necessary for the smooth functioning of the Project ?

Yes

(3) In case the answer is no, explain give reasons why technical assistance is not necessary.

(4) In case the answer is yes, what type of technical assistance is necessary ?

(i) Short term expert staff sector

(ii) Long term expert (extension services) sector : (dissemination of new varieties)

(v) Young Japanese Volunteer

(Clearly describe the sector in which young volunteers are needed and other related information)

(vi) Programme of development study (feasibility study, and Guiding Plan)

(Give an outline of this development study programme

(5) Has the official request been submitted ?

1. Yes 2. No

(iii) If so, give the date of submission of the request

(iv) If not, give reasons why the official request has not been submitted.

(v) When will the proposal be presented to the Japanese Ambassador ?

At the same time as the present proposal

II. National Development Plan

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1. Title of Plan : (Attach all volumes of the most recent National Development Plan

10th National Economic and Social Development Plan (2000-2004)

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2. Socio-Economic Situation

(Mention basic economic statistics)

Senegal has a surface area of 197,000 km² for a population of 9.5 million inhabitants and an annual growth rate of 2.7%.

In 2001 the GDP was 3,380 billion CFA F – US D 520 GDP/per capita and an annual growth rate of +5.7%. Inflation rate is of 3.9%. Rate of Investment is 16.8% of the GDP. Current balance of payments outside official transfers stands at –7.5% of GDP – public debt represents 85% of GDP –public external debt stood at 2,266 billion CFA F at the end of 2001 (+2.1%), representing two-thirds of GDP Budget revenues represent 19.7% of GDP which is 603 billion CFA F while budget expenditure represents 21.7% of GDP, which is equal to 733 billion CFA F, placing our global account at –3.9% of GDP, minus grants.

(1) GDP

USD 652 per capita

(2) National revenue (per sector)

Primary sector 20.6%, Secondary sector 18.5%

(3) Unemployment rate

12 to 13% of the active population

(4) Inflation rate

3.9%

(5) Economic growth rate

5.7%

(6) Balance of payments

72 billion CFA F

(7) Population (Globally and per sector)

A population of 9.5 million inhabitants and an annual growth rate of 2.7%.

Rural population represents 65% of the total population

(8) State of debt servicing

85% of GDP

(9) Sum of accumulated debt : It is estimated at more that 1000 million CFA F

(10) Main exports and imports

Exports : sea products, groundnuts, phosphate, mine products
Imports : petroleum products, foodstuffs, rice, maize, flour and industrial products.

(11) Main trading partners

France, Italy, United States of America, Arab countries, Japan, Germany

(12) Population growth rate

9.5 million inhabitants
Growth rate : 2.7% per annum

(13) Average life expectancy

49.5 years in 1990	men : 51 years
50 % life expectancy at birth	women : 51 years

(14) Birth and Mortality rates :

Fertility rate	6.6 children per woman
Net mortality rate :	19 out of every 1,000
Net birth rate	86.4 out of every 1,000
Juvenile mortality :	114 in every 1,000

(15) Medical system :

14 hospitals, 16 medical centers, 284 maternities, 492 surgical structures, (for children aged 1 – 5

Decentralization and people's participation as per the objectives of " Health for all by the year 2000".

(16) Epidemic diseases

Tuberculosis, Yellow fever, measles, diphtheria, tetanus, malaria, chicken pox, polio

(17) Literacy rate

68% of the population

(18) Enrolment in higher education

58.5% (1991)

3 Content of Plan

(1) Plan's priority sectors

- Primary sector : 31%
- Rural sector

(2) Plan objectives

(Describe the objectives very clearly and indicate the main features)

- To sustainably raise the country's overall productivity
- Bring about accountability and solidarity
- Adapt the education system, build aptitudes, develop and extend social communication

- Contain the upsurge and secure the rural economy through the implementation of the three yearly investment programmes and the 8th political action plan.

(3) How will the objectives be achieved? (Please describe and cite the specific projects and programmes for attaining these objectives)

The SPSCL will produce enough pre-base seeds to meet the needs of the country. With the equipment received it will regenerate, conserve and distribute new varieties of NERICA rice to other partners in the network.

The farmers will be trained in improved seed production techniques.

(4) When will the Plan be implemented?

The Plan will be implemented in 2004-2007

(5) Relations between this Project and the National Development Plan. (Please describe the importance of the status of the project in the National Development Plan)

This project falls within the framework of the food security policy and the fight against rural poverty.

(6) Is there any other assistance accorded by other donors for projects/programmes contained in the National Plan.

(i) Yes **(ii) <u>No</u>**

(ii) If Yes, give some basic information on the type of assistance

(a) Donor country:
(b) Title of Project:
(c) Cost of Project:
(d) Type of assistance: (Donation, Credit, technical assistance, etc …)
(e) Overview of the Project:

NERICA Seminar

Nairobi February 2004

Senegal's Presentation

Ministry of Agriculture and Water

SOCIO-ECONOMIC CHARACTERISTICS

- Annual Imports :
    - 600 000 tons ;
    - Estimated cost: 120 billion;
    - Market share of imported rice: 87 à 93 %
- Average consumption/person : 60 à 80 kg/person/year;
- Demographic growth 2.6 /year

PRODUCTION CHARACTERISTICS

- National Production :
  - 150 à 200 000 t ;
  - 14 % of national needs
  - 7 à 13% of the market share of rice
- Production systems in irrigated and rainfed zones with several varieties adapted to each zone using appropriate technology packages:
  - Average yield from irrigated zone : 5.5t/ha with highest yields of 8 to 12 t;
  - Average yields from rainfed zones: 1 à 1.5 t /ha with highest yields of up to 2.5 t;

CONSTRAINT AFFECTING PRODUCTION

- Irrigated Zones :
  - Less intensive cultivation (poor acces to credit, poor water and land management, ...;
  - Poor competitiveness of production systems
- Rainfed Systems :
  - Soil salinity and acidity;
  - Availability of good performance vegetable material and quality seeds;
  - Low production resources and poor access to credit;

GUIDELINES AND PERSPECTIVES

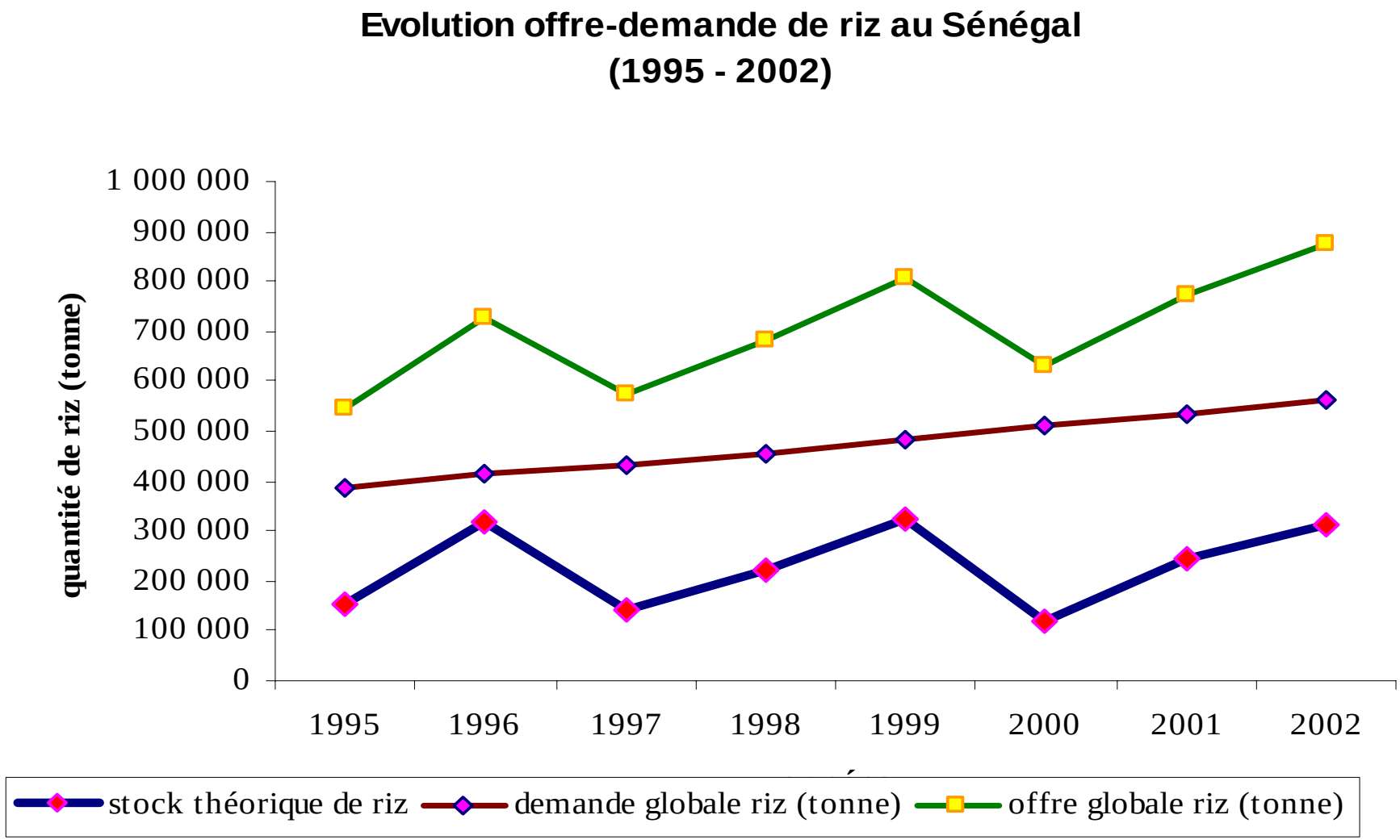
Tests and dissemination of better and more productive rainfed rice varieties;

Production quality seeds;

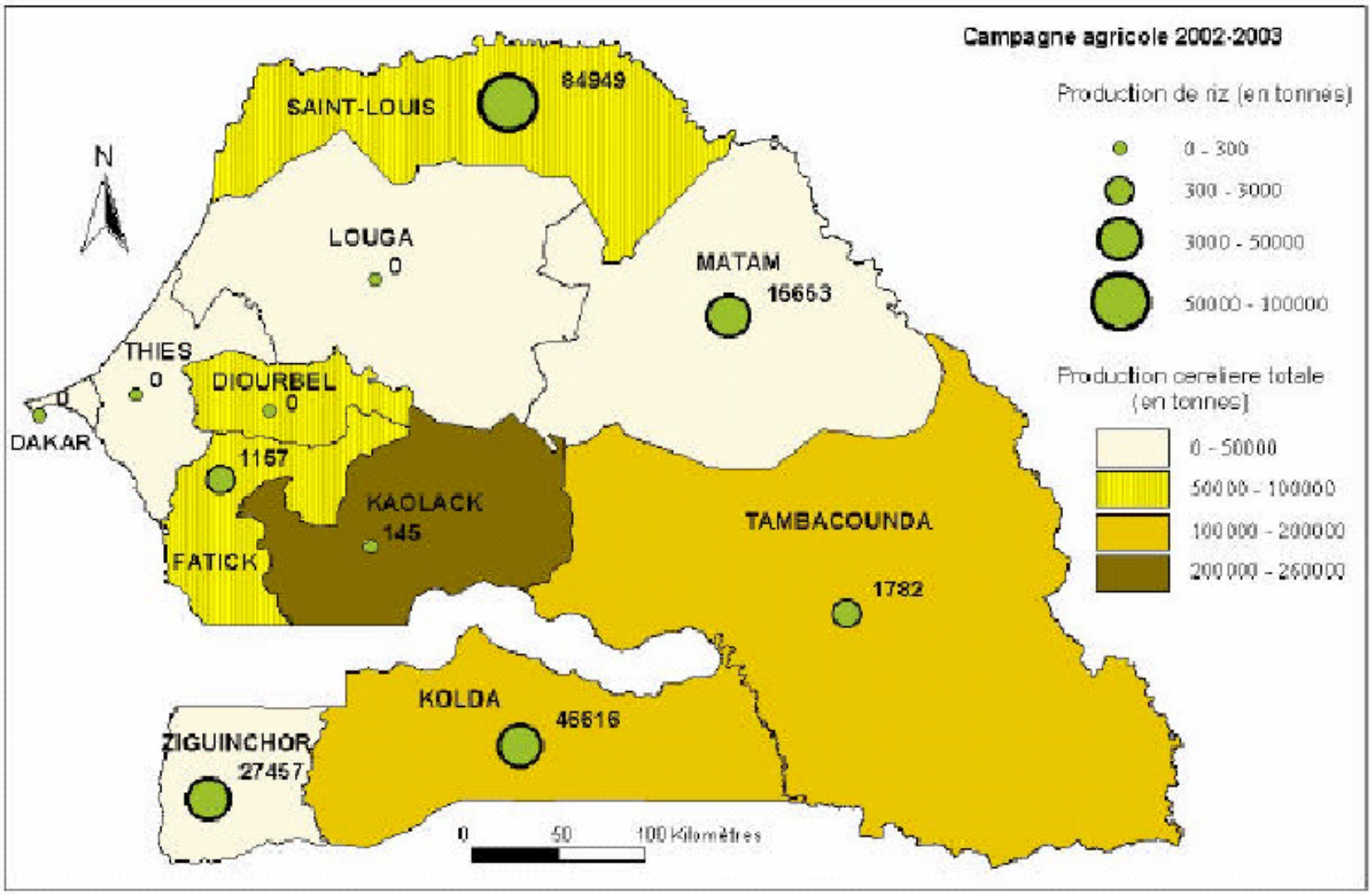
Increased use of certified seeds;

Capacity building for producers;

Improvement of equipment and infrastructure


Evolution offre-demande de riz au Sénégal
(1995 - 2002)
quantité de riz (tonne)
1 000 000
900 000
800 000
700 000
600 000
500 000
400 000
300 000
200 000
100 000
0
1995
1996
1997
1998
1999
2000
2001
2002
stock théorique de riz
demande globale riz (tonne)
offre globale riz (tonne)

Rice growing in Senegal 2002/2003



Source : ISE/PNUE (2003).

Group-B

Ethiopia, Kenya, Malawi, Mozambique, Tanzania, Uganda, Zimbabwe

ETHIOPIA

Rice Production in Ethiopia

1. Agricultural Development and Food Security Program

The serious and accelerating problems of food insecurity are still considered a national security threat despite the government has been carrying out various kinds of measures for decades.

In order to increase food production and productivity, crop diversification is supposed to be one of the important measures. Since Ethiopia is endowed with the varied agro-ecological zones, the food security program indicates location-specific comparative advantages in high value crop production. Crop diversification will be reducing the risks related to crop failure. Strengthening research and extension services in target areas is also a key driver of the program.

2. Rice production and research in Ethiopia

Before 1985, the government and NGOs did not give emphasis to rice. In late 1980's, a large-scale rice production activity started with governmental resettlement programs in northwest and west part of Ethiopia. Engineers of North Korea also promoted rice production around Lake Tana, the largest lake in Ethiopia. These endeavors, however, could not sustain the production for long and hence, the total rice production started to decline in mid 90's.

In late 90's, people who lived in the waterlogged area around Lake Tana recognized the advantage of rice cultivation and began to expand rice production again. Though total amount of rice production is still small (see the table below), people of several areas in Ethiopia have strong interest to produce rice and need technical support. Rice is, now, being considered as one of potentially important commodities in the national agricultural research and extension system.

Production and Production area of Cereals (2001/02:Central Agricultural Census Commission)

	Teff	Barley	Wheat	Maize	Sorghum	Millet	Oats	**Rice**	Total
Area(1,000ha)	1,896	966	1,090	1,702	1,195	286	44	**8**	7,187
Prod.(1000t)	1,657	987	1,484	3,086	1,583	309	39	**16**	9,160

3. Intervention for Research and Dissemination of NERICA

NERICA is expected to contribute to the food security, particularly in drought prone area, because of its early maturing character. In 2002, Ethiopia Agricultural Research Organization (EARO) in collaboration with JICA and SG2000 started NERICA multi-location trial in twenty-one sites in almost all Regions. Last year, field trips to Uganda and Guinea, where NERICA is already produced, were conducted. A national workshop on rice research and extension was also held in Ethiopia and various stakeholders attended it. UNDP has decided

to support the promotion of NERICA through “ Japan Human Resource Development Fund”.

However, a lot of efforts should be done for the development and dissemination of rice technology in various locations. Capacity building of researchers, engineers, extension workers and farmers are needed urgently. Development of post harvest technology and marketing is also important. For achieving these tasks, the government intends to strengthen the relation among the organizations concerned, such as research and extension agencies in federal/regional government, foreign/international organizations and NGOs.

KENYA

RICE RESEARCH AND RICE PRODUCTION IN KENYA

Presented at:

Seminar on promotion of rice production and Dessemination in Africa (Nairobi, Kenya, on 10-11th Feb 2004)

By

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NATIONAL IRRIGATION BOARD (NIB)

RICE RESEARCH AND RICE PRODUCTION IN KENYA

I. Introduction

1.1 Background Information

Only about 17% (9.9 m ha) of Kenya's land mass is suitable for rain-fed agriculture. The other 87% (50.7 million ha) is arid and semi-arid (ASALs). There is therefore need to intensify land use in the arable areas and innovatively use the resources in the ASALs to meet the challenges of the growing food requirements. Irrigation is one of the options for utilizing these resources.

The national irrigation potential stands at 540,000 ha with the irrigation potential by basins distributed as follows:

Basin	Irrigation potential (ha)
1. Tana	205,000
2. Athi	40,000
3. Lake Basin	200,000
4. Kerio Valley	64,000
5. Ewaso Ngi'ro	30,000
Total	539,000

Source: National Water Master Plan, 1992-Ministry of Water Development.

National drainage potential stands at 600,000ha. This gives irrigation and drainage potential of 1,140,000m ha.

Cereal requirements in the country have steadily risen by 3.7% per annum, more than doubling from 3.2 million tonnes in 1990 and are projected to 6.9 million tonnes by the year 2010. Rice will register the sharpest increase in deficit, from 37,000 tonnes to 161,000 tonnes over the same period.

Rice rank 3rd after maize and wheat, which are the most important cereals of Kenya. Total rice production is about 70,000 tonnes per annum. Consumption is about 130,000 tonnes indicating a deficit of 65,000 tonnes that have to be imported.

Rate of consumption of rice is increasing at a higher rate (>12%) than other cereals (wheat 4%) due to quick changing eating style. Most produced rice in Kenya is irrigated. Average unit production under irrigation is 5.5 t/ha for aromatic varieties and 7 t/ha for non-aromatic varieties. Unit yield in rain fed is about 2t/ha.

1.2 Total estimate area under rice is as shown in the table below:

Region	Developed Area(ha)	Potential Area(ha)
Mwea	10,000	30000
Ahero	1,538	54,000
West Kano	1,320	14,170
Bunyala	243	10,000
Others	2000	>240000

2. RICE RESEARCH IN KENYA

Trial and error research in Kenya started in 1954 when rice was first introduced in Mwea. However, the communities that lived near riverbanks near the cost and region grew local rice varieties.

Organised rice research started in 1969 at Ahero Irrigation Research Station (AIRS). The site was preferred to enable quick solutions to rice cultivation problems that were more in Western Kenya.

AIRS had a sub station Mwea Irrigation Research Station (MIRS) where rice cultivation problems of Western Kenya region were addressed.

Although KARI has the mandate of conducting agricultural research, NIB was allowed to continue with irrigated rice research since it had the trained personnel on irrigated agriculture and the rice farmers. KARI conducts upland rice research. Research conducted has been mainly operational research – i.e. the research aimed at solving the problems facing farmers directly.

Research findings were directly channelled to farmers through farmers' field demonstration trials.

General Rice Research objective is to solve rice production problems to achieve food security and reduce poverty by;

i)Increasing rice yield.
ii)Increasing rice quality.
iii)Reducing production cost.
iv)Increasing farmers income

Research is based on following disciplines:

i)Variety selection,
ii)Crop protection and
iii)Engineering (agricultural machinery, water management, Irrigation and drainage).

It is focused on operational problems faced by rice growers of the region within which the station is located.

The main rice growing problems currently addressed in Mwea are soil fertility, variety improvement and evaluation of double cropping technologies. No irrigated rice research is going on in other rice growing regions.

MIAD Center was an institution built through technical co-operation of the Government of Kenya and the government of the Republic of Japan to develop technologies to improve rice production in Mwea and Kenya as a whole. The co-operation period was within 1990-1998. The station is currently at the level of refining and implementing the developed technologies in the farmers' field. The technology development strategies followed were:-

1. Rice cultivation technologies;

   (a) Improvement of rice crop husbandry
   (b) Variety selection and improvement
   (c) Post harvest processes improvement.
   (d) Rice quality improvement.
   (e) Double cropping investigation & improvement.

2. Paddy soil improvement through;

   (a)Cultivation of Soya beans and other legumes as a second crop.
   (b)Cultivation of other upland crops within paddy fields.

3. Improvement of machinery use;

   (a)Dry ploughing
   (b)Improvement machinery handling and operation.
   (c)Improvement operator skills and knowledge.

4. Improvement of water management techniques;

   (a) Irrigation and drainage research
   (b) Facility registration
   (c) Weather data collection
   (d) Data collection at water measuring points followed by analysis & interpretation to solve water shortage problems

5. Training

   (a)Rice cultivation, machinery, water management and training staff.
   (b)Extension staff.
   (c)Farmers.

Rice seed

Rice seed is produced at both MIRS and MIAD.

II. The Key Research Areas Addressed

1. Rice quality improvement. Varieties with high grain quality have been selected to replace the inferior commercial varieties, which were low in quality though high yielding.

Attention given to;

- High grain yield
- High grain quality
- Consumer preference.

In addition to this research, is directed towards purifying the highly valued Basmati 217 & 370 varieties to improve their unit yield.

Currently price of none aromatic varieties are very low due to importation of cheaper non-aromatic types. Many farmers in Mwea are resulting to Basmati cultivation since its returns are high. Consequently research emphasis is to improve Basmati as well as testing the possibility of cultivation of Basmati varieties in areas previously earmarked for non-aromatic varieties. This implies that the previous cultivation of lower quality high yield varieties is being reduced while the cultivation and improvement of the high quality varieties is being enhanced through research. This is to enable Kenyan rice to sell in the liberalized economy. Increasing Basmati production and reducing high yielding non-aromatic varieties means reducing the quantity of rice produced locally. This of course calls for development of more land for rice growth and selection of high quality higher yielding varieties to be self-sufficient.

New research variety introductions are;-

a)Basmati 370
b)ITA 310
c) JASIMINE

Varieties being improved are
(a)Basmati 217 for Mwea
(b)IR 2793 (NIBAM 108) for Mwea and Western Kenya)

2. Plant establishment methods;

Introduction of wet seeding which research has shown to be better than transplanting in terms of yield, ease of management, and cost of production. The system has potential to increase yield at lower production cost thereby increasing farmers' income.

3. Alternative crop for double cropping season. MIAD research work recommended cultivation of rice legume in the double cropping programme viz. Rice Rice legume-Rice Rice legume. The objective being increased utilization of the paddy fields to give farmers stable yearly income. Research is concentrating on polishing up the double cropping package to fully recommend it to the rice farmers. The double cropping package contains:

   a)Rice varieties suitable for the second season.
   b)Appropriate legumes for the rice off season period.
   c)Second season rice plant husbandry.
   d)Second season fertilizer management and paddy soil fertility improvement.

4. Ratoon rice improvement.

   Basmati varieties have fast ratooning ability. Ratoon crop has very low cost of production while yields of about 90% of the main crop yield can be realised.

   Farmers have been producing ratoon crop without research recommendations. Their yields are low due to low attention and poor management. Research is focussing on development of ratoon production package that will generate income during the rice off-season period.

5. Alternative sources of paddy soil fertility improvement.

   Research focus on testing
   i) Organic manures – Encouraging rice straw utilisation. Searching solution to increased stem rot disease associated with continuous use of rice straw manure.

   ii) Studying Legumes such as;
   a)Soya beans
   b)Sesbania
   c)Green grams
   d)Chick pea

   iii) Use of Azolla – which is already in Mwea paddy fields. It proliferates itself in Mwea rice fields eliminating the need for expensive introduction.

6. Insect pest and disease control
   Screen new varieties for their resistance to pest and diseases.
   Evaluate efficacy of pesticides introduced in the market against common rice pests.

   Common pests are;
   1. Stem borers
   2. Rice whole maggot
   3. Rice seedling flies
   4. Rice green stinkbugs
   5. Beetles – vectors of rice yellow mottle virus (RYMV) in Western Kenya.

7. Weed control Research - weeds are a major threat in rice production especially in Western Kenya. Herbicides have tested with the objective of reducing drudgery in irrigated rice farming.

   Satunil is currently recommended as suitable selective herbicide for early weed control. Roundup is also recommended for non-selective weed control before rice sowing.

8. Research on use of locally available technologies.

   a) Animal drawn plough in place of tractors and
   b) Manual land preparation by means of the locally available cheap labour. Effects of these technologies on yield and quality.

9. Rice farmers health improvement research
   a. Microbial control of mosquitoes using *Bacillus thuringiensis israelensi*s(Bti) and *Bacillus sphaericus* (Bs). A collaboration of international centre of insect

physiology and ecology (ICIPE) and MIAD

b. Rice and fish culture. A study between University of Nairobi, Sagana fisheries and MIAD.

III. RICE VARIETIES CULTIVATED

VARIETY	PERFORMANCE						Current market
	Research (t/ha)			Farmer (t/ha)			Kshs. per kg paddy
	Max	ave	min	max	Ave	Min	
BW 196*	13 (70)**	7 (38)	5.6 (30)	11 (60)	6.5 (35)	4.6 (25)	11.10
IR 2793	12 (65)	6 (32)	5.2 (28)	10.2(55)	5.6 (30)	4.3 (23)	13.30
ITA 310	9 (48.6)	7 (38)	6 (32)	-	-	-	22.20
BASMATI 217	7.4 (40)	5.6 (30)	4.6 (25)	6.5 (35)	4.6 (25)	3.3 (18)	30.00
BASMATI 370	7.4 (40)	6.5 (35)	5.2 (28)	6.9 (37)	4.6 (25)	3.7 (20)	30.00

* Varieties are listed in ascending order of grain quality and consumer preference.
** Figures in brackets are bags of paddy (75kg) per acre

BW 196 is a tall-improved variety with medium long and thick grains. It gives high broken grain other milling. Grains have high amylose content.

IR 2793 IRRI improved long medium thick grain variety. Have nearly translucent grains, which have lower amylose content than BW 196. This variety is highly preferred by the Western Kenya consumers.

Basmati 217 and 370 are both indica types with close resemblance to the wild varieties.

Their grains are slender medium long and translucent. The varieties have low amylose content and therefore separate after cooking and cooling. Most Kenyans prefer this characteristic. Grains have sweet smelling aroma. These varieties are therefore highly preferred by consumers in Kenya.

ITA 310 – has higher yield and basmati characteristics but no aroma. It is currently being used for blended rice in liberalized rice marketing to reduce the cost of Basmati.

Jasmine - has basmati characteristics except that grains are longer and thicker grains. It yields higher that basmati. Its aroma disappears after cooking.

RICE PRODUCTION CONSTRAINS

a) Research Constrains

1. Rice had not been listed along the staple foods of Kenya. Its research has therefore not received the attention it calls for.

2. The major Kenya agricultural research organisation (KARI) has not concentrated in rice research a food crop. Most emphasis is directed to maize and wheat.

3. There are no adequate funds directed toward rice research.

4. Trained rice researchers often moved to greener pastures. This has left rice research highly devoid of researchers. They need to be regrouped to continue with what they trained for.

5. Liberalization problems also affected rice research by almost putting it to a halt. Rice research funding that used to come from the Government was no longer available. Alternative sources of funding rice research are needed to bridge the already existing rice research gap.

Rice research Areas requiring urgent attention

1. Rice cultivation

(a) Rice breeding for high quality rice, disease resistance (especially against RYMV) cold resistance, high yield in Basmati varieties.

Variety selection – need funds to continue testing existing commercial varieties against new ones and adjust husbandry requirements for improved yield.

Require irrigated NERICA varieties to evaluate them against existing commercial varieties and the rain fed NERICA varieties being tested at Mwea.

(b) Seed purification

To achieve good quality and high yield rice production, it is necessary to maintain purity in Seed.
In addition to this there is need to purify the highly valued Basmati 217 & 370 varieties to improve their unit yield.

(c) Wet seeding

Wet seeding is also referred to as direct seeding of pre-germinated seeds. Demonstrations at farmers' fields in Mwea and Tana River are required. Studies are also needed to quantify fertilizer(s) utilization.

(d) Double cropping

Main farmers in Mwea are used to growing only one crop per year. During long rains the fields are left fallow out-grower farmers are taking up this technology. There is need to polish up this technology to adopted by all in order to increase rice crop production for food security and poverty reduction.

(e) Multiple cropping

In order to achieve double cropping there is need to introduce other crops to form a rotation pattern which will also help in soil fertility and structure improvement.

Soya bean cultivation is very promising. It only requires refining at farmers fields and improving marketing to settle soil fertility and poverty problems.

(f) Soil Fertility and fertilizer use

Need to improve both type of fertilizer and fertilizer utilization for better response. This should be through fertilizer type, timing of application and rates per variety.

Studies in the area of utilizing organic fertilizer are also necessary in order to supplement the in organic once and also address the methods of making these organic fertilizers under different environments. These include compost and green manures. Azolla that is freely propagating in Mwea requires address to boost yields and reduce cost incurred on fertilizers.

(g) Weed control research to eradicate noxious weeds such as *Echinochloa cruci-galli* that have invaded Mwea and other rice growing areas

(h) Ratoon rice improvement.

Farmers have been producing ratoon crop without research recommendations. Their yields are low due to low attention and poor management. Research should focus on development of ratoon production package that will generate better income for the farmers during the rice off-season period.

2. Machine utilization

(a) Wet land preparation

Currently land preparation is done through rotavation method. There is need to carry out studies in relation to the time and depth of soil turning with a view of cutting cost and maintaining high production.

(b) Dry land preparation

This is a cheaper alternative method of land preparation. But it needs to be refined to ensure good tilth hence acceptability by the farmers. This method can be enhanced further if soil structure is improved. Incorporation of other technologies such as animal drawn plow, manual digging and zero tillage is important.

(c) Animal power

Once the soil structure is improved, it is possible to use animal power in land Preparation. Proper harnessing and implements choice should be encouraged.

(d) Heavy Plant (earth moving equipment)

These are expensive machines, which once available should be used properly. There is need to develop technological know-how on how to utilize and maintain this machine.

(e) Soil improvement

Soil physical characteristic should be improved in order to achieve maximum machine out-put. This can be through encouraging use of organic manures like compost and planting of legumes during the off-season period.

3. Irrigation and drainage research

a) Facility maintenance

Facilities can deteriorate if not well maintained. There is need to carry out studies on cost effective method of facility maintenance.

b) Development of simple cost effective facilities

Facilities can be very expensive and thus need to develop cost effect facilities if possible using locally available materials

c) Drainage and reclamation

Continuous Irrigation makes some low areas to be boggy which eventually become marshy. Machines cannot access these areas. There is need to develop simple method of draining these areas i.e. sub-surface method using locally available materials.

4. Water Management

Once water is available, there is need to distribute it minimising loses as much as possible. If not done some areas get surplus where as the far end areas get shortage. This results in low and poor quality yields.
Additional drought tolerant varieties need to be introduced.

5. Post harvesting handling

A lot of loses are incurred during these stage. In some areas 20% loses is recorded which must be reduced through research.

Studies in the areas of storage and improving on milling quality are necessary.

IV. RICE CULTIVATION TECHNIQUES

The main plant establishment method is transplanting that involve wet bed nursery establishment:

Seeds are soaked in water for 24 hours and then incubated for about 48 hrs before sowing.

The pre-germinated seed are evenly broadcast on a ploughed puddled and well-levelled nursery bed.

Phosphate and Nitrogen fertilizers are applied in the nursery bed a day before sowing

at a rate of 60kg P2 05 5/kg and 114kgN/ha respectively Nitrogen top-dressing is done at l2 days after sowing at a rate of 57kg N/ha

- Seedling matures at 27 DAS in Mwea region while WKS seedlings take 21 days to mature.

MAINFIELD PREPARATION

Main method of land preparation is rotavation several animal puddlings and levelling together with weeding are done before transplanting.

Phosphate and Nitrogen fertilizer are applied in both Mwea and Western Kenya Schemes at transplanting. Potash is also recommended for the Mwea site.

FERTILIZER RATES

Fertilizer type	Rate kg/ha
Phosphate(TSP)	60kg $P_2 0_5$)
Nitrogen (Sulfate of Ammonia)	78 - l04kgN - depending on variety (high rate is for the high yielding varieties and the low rate is for the low yielding Varieties
Potash (Murrate of potash)	50 kg K_2O

Nitrogen fertilizer is applied in split -1/2 applied basal and half top-dressed at the reproductive stage. Rate is determined per variety.
Seedling is transplanted at a rate of 2-3 per hill spaced l0 or 20 cm apart. Research use row transplanting.

CROP WATER MANAGEMENT

Fields are flooded for rotavation after which they remain flooded until transplanting time when water level is reduced to the minimum (3cm high) water level is then raised to l0cm high for seven days. The level is then reduced to 3 cm remaining so until panicle initiation stage. At panicle initiation water level is increased gradually to l0-l5cm until onset of grain filling when it is progressively reduced to 3 cm. Finally water is drained two to one week before harvesting see appendix for water management diagram.

WEED MANAGEMET
Main method of weeding is hand weeding. This starts after land preparation. The transplanted crop is weeded l6 DAT, and at 35 DAT

Research uses herbicides such as
(l) Roundup for zero tillage
(2) Satunil - This is applied 7 days after sowing to control all weeds at 2-3 weed leaf stage

CROP PROTECTION

Nurseries are sprayed with sumithion at l0days after sowing. Incase of heavy infestation by stem-borers Furadan is applied at rate of lg/m2. Resistant varieties are cultivated.

MAINFIELD- Pest control is done at 35 days after transplanting (DAT) using Fentrothion spraying or Furadan
Common pests are
Maraiapha separatella
Stalk eyed fly (Diopsis)
Case worms
Rice Whorl maggot
Rice beetle
Rice green stinkbugs.

DESEASE CONTROL
Common rice diseases in Mwea are stem rot, sheath bright, and blast.
Control - resistant varieties used together with maintenance of good crop husbandry.

Western Kenya Irrigation Schemes (WKS)

Common diseases are similar to those found in Mwea but the incidences are higher than in Mwea because of the humid and hot climate experienced in WKS that encourage pathogen growth.
Rice yellow mottle virus is a disease of WKS it has been reduced by control of the host vector and maintenance of good plant husbandry practices as well as use of resistant cultivars.

V. LIBERALIZATION EFFECTS

In 1998 Mwea rice farmers revolted against the NIB services sighting discontent on issues such as:

1. Land tenure
2. Irrigation rates, regulations
3. Marketing of rice
4. Producer price of paddy
5. Security-use armed forces to guard harvested rice
6. Delay in payment
7. Advance payment of service for those who had withheld paddy.
8. Liberalization – multiparty politics sweeping the Country from 1992 – 1997 caused friction with tight controls of the Irrigation Act. Farmers became amenable to political manipulation with promises of quick riches.
9. Subsidizing other NIB Schemes.
10. Decentralization of decision making.

Farmers were instigated by politicians to strengthen their co-operative to offer services given by NIB. This was intended to remove the middleman for higher returns to their efforts. The farmers' co-operative took over the provision of services. The cooperative harvested the NIB managed crop deducted the cost of production but failed to remit the same to NIB. However, it has not been able to offer services as was expected. Currently the Scheme is facing major problems viz.:

1. Low paddy prices,
2. Lack of payment,

3. Mixing of seeds,
4. Variety impurities caused by segregation,
5. Silting of irrigation channels,
6. Water shortage,
7. Poor management resulting to interference with cropping schedules,
8. Deterioration of roads condition
9. Increase of health problems such as Bilharzias. Disease control measures were not followed.

However a Steering Committee comprising of all Mwea Stake holders was established early 2003. The committee shared duties to various organisations. So far it has restored a rice cultivation program that incorporates rice out-growers, formed water users association, gave farmers organisations rice production management and liberalised marketing. Consequently, the 2003 crop was grown effectively.

VI. RICE POST HARVESTING ACTIVITIES

Harvesting is by cutting and threshing manually. This is followed by wind does.

1. Drying – This is done to achieve a moisture content of 14%. Drying is done by spreading the paddy under the sun and turning it frequently. Research work, recommended drying up to 16% and store for better milling results.

2. Bagging and storage – Once dried, the paddy bagged and standardised at 75 kg per bag. This is to ease the handling. The bags are then stacked in stores.

3. Milling - This is done throughout the year depending on the rice demand. From milling there are 5 products as follows:

   Average milling percentages (averages)
   (a) Whole grain rice – 40.0%
   (b) Broken rice - 20.0%
   (c) Chicken feed - 4.0%
   (d) Bran - 10.0%
   (e) Husk. - 25.0%

All these products are marketed either for human consumption or as animal feeds. Mostly the husk is normally used in flower farms for mulching. Other times it is milled mixed with bran and used as animal feeds.

RICE PRODUCTION CONSTRAINS

1. Lack of skilled rice extension workers
2. Water Shortage
3. Unavailability of credit services to acquire inputs
4. Health problems in irrigated rice regions
5. Irrigation and drainage structures in the rice out grower sector
6. Low rice cultivation experience in the rice out grower sector
7. Low paddy field utilization

COLLABORATION

There is need to co-operate and collaborate in rice research, extension and training for future improvement of rice farming in this region.

MALAWI

THE PRESENT SITUATION AND CONSTRAINTS OF RICE PRODUCTION IN MALAWI

BY

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ABSTRACT

Rice (Oryza sativa L.) is the second most important cereal crop in Malawi. Most farmers grow rice for sale to non-rice growers and rice milling companies that process the rice for both domestic and export market. Rice is mainly grown along the Lakeshore Plain, Lake Chilwa Plain, the Shire highlands and the lower Shire valley. There are a number of varieties recommended for production in the country out of which Kilombero and Faya 14M69 are ideal for rain-fed production. Narica was only introduced in 2002/2003 season and it is still being multiplied to see its adaptability under Malawian conditions. Cross breeding work is also being started to improve local varieties with traits of Narica. The yields of rice in Malawi are low owing to a number of production constraints namely; low soil fertility, poor crop husbandry and agronomic practices, pests and diseases, weed infestation and lastly poor water management. Despite these challenges the government of Malawi is striving to improve rice yields under both irrigated and rain-fed production.

INTRODUCTION

Rice (*Oryza sativa L.*) ranks second to maize as the most important cereal food crop in Malawi. The crop is also grown for sale to non-rice growers and rice milling companies. It is mainly grown along the lakeshore, Lake Chilwa Plains, the upland dambos of Shire highlands and the lower Shire. The main growing districts are Karonga, Nkhatabay, Nkhotakota, Salima, Balaka, Zomba, Machinga, Phalombe, Chikwawa and Nsanje.

Rice is adapted to heavy clays although it performs satisfactorily well in a wide range of soils with pH 5.5-8.5. Rice favours areas where temperature ranges from 22°C to 25°C and annual rainfall range of 660mm to 2421mm. The area under rice production in Malawi is 50,146ha and 86% of this area is under rain-fed production.

The National Aims

The national aim is to increase grain yields per unit area at irrigation rice schemes and also increase both the yield and area of rain-fed rice to meet both the domestic and export demand.

TYPE AND VARIETES OF RICE PRODUCED IN MALAWI

Indica is the type of rice widely grown in the country since it is high yielding and its taste is acceptable by the Malawian citizens. Japonica rice is being introduced by the Japanese International Cooperation Agency (JICA) at Bwanje Irrigation Scheme in Dedza District.

The most popular varieties for rain fed production are Faya 14M69 and Kilombero. Most farmers are growing a lot Faya strains known by different names in different areas e.g. Mwasungo, Singano, Chimdimba, and Amanda. These Faya strains are widely accepted by farmers in Malawi despite several weaknesses such as lodging, shattering and low yielding.

NERICA was introduced in Malawi in 2002/2003 through the West African Rice Development Association, 5 grams each of the four NERICA varieties namely IDP91hb, IDP38hb, IDP28hb and BB-8 were acquired for seed multiplication. Some seed was issued to farmers while the rest was multiplied at Lifuwu Agriculture Research Station in Salima District. Performance at farmers field was poor due to management problems but at the Research Station yield ranged between 2360kg/ha and 3160kg/ha with IDP38hb being the highest and BB-8 was the lowest. These yields are higher than the national average of about 1,600kg/ha. For the 2003/2004 season, the seed obtained so far has been issued to farmers through Sasakawa Global 2000 for distribution to farmers while the rest will be used in cross breeding with local varieties at the Research Station so that traits of NERICA are transferred to the local varieties. NERICA is yet to be recommended for Malawi based on its field performance. (Personal communication)

The table below shows the potential yields of all recommended varieties of rice in Malawi:

Variety	Yield Potential in metric tonnes/ha		Days to maturity	
	Rainy season	Dry season	Rainy season	Dry Season
Faya 14M69	4	-	155	-
Kilombero	4.4	-	130	-
Nunkile	5.9	5.4	112	140
Mtupatupa	6.3	6.0	130	155
Vyawo	5.9	6.3	130	150
Senga	5.7	6.2	125	145
Changu	5.6	5.8	130	145
Bluebonnet	4.6	3.7	125	155

However, yields by the Malawian farmers are very low i.e. 1-1.6 metric tonnes/ha compared to the potential due to poor water management, weed infestation, low fertilizer application, and effects of pests and diseases.

RICE PRODUCTION PRACTICES

1 Land Preparation

Land preparation should be done soon after harvesting when the soil is moist. In Malawi, land preparation is accomplished by using hand hoes, work oxen ploughs and tractor drawn ploughs. Use of tractor drawn ploughs is strongly recommended since it opens up the soil hardened by puddling for easy root proliferation. Unfortunately, there are very few units of tractors to satisfy the demand. Bunds are constructed around plots of convenient sizes depending on the gradient for efficient water control.

The lumps produced after tillage are broken down to fine particles to ensure easy planting and good seedling establishment.

2 Planting

The recommended methods of planting under rain-fed rice cultivation are:

(a) Broadcasting:

It is the commonest method of planting in rain-fed rice. The method is advantageous in that it requires less labour, saves on inputs i.e. fertilizer and chemicals that would have been used in the nursery and lastly the rice grows well and matures earlier than transplanted rice.

The method has some limitations since the seeds can be picked up by birds if not thoroughly covered, lack of rice-stand uniformity since the seedlings emerge at different times, reduced tillering potential and that it is difficult to control weeds.

(b) Dibbling

This is the planting of rice at defined spacing between stations. The method is done successfully if the clod breaking after ploughing is accomplished. The method is advantageous in that it makes weeding and scuffling after fertilizer application easier, supplying is simple and lastly dibbled rice matures earlier than transplanted rice.

The best time for rice planting is between November and December.

(c) Transplanting

This method is practiced in irrigation schemes and it involves raising seedlings in the nursery before actually transplanting them in the field. The method requires a lot of resources in raising the seedlings in the nursery. The seedlings are ready for transplanting after 25-35 days after sowing depending on the season. The ideal seedling for planting should have 3-5 leaves at the time of planting. The seedlings should be transplanted at a depth of 1.5cm for good establishment and four seedlings are planted per hill at different spacing depending on the variety as follows:

Variety	Spacing
• Nunkile	23cm x 15cm
• Mtupatupa	23cm x 15cm
• Vyawo	23cm x 15cm
• Senga	23cm x 15cm
• Changu	23cm x 15cm
• Bluebonnet	23cm x 15cm
• Faya 14M69	23cm x 23cm
• Kilombero	23cm x 23 cm

FERTILIZER MANAGEMENT

Rice responds very well to fertilizer application and the recommended fertilizer rates are as follows:

Recommended Rates

Nitrogen 60-80kgs N /ha depending on variety.

Phosphorus 25kgs P_2O_5 /ha

Sources

(i) Basal Dressing

120kgs 23:21:0+4S

Basal dressing is done 20 days after seedling emergence.

(ii) Top Dressing

70kgs urea /ha

Top dressing is done at 60 days after seedling emergence.

Method of Application

Fertilizer is applied by broadcasting using hands and calibrated containers according to size of the field. Dividing the field into smaller plots facilitates the application.

Time of Fertilizer Application

The application of fertilizer should be done on clear and calm day; and that there is no dew on the leaves to avoid scorching. The water should not exceed 5cm at the time of fertilizer application.

Weed Management

Weeds reduce yield by 24-75% in rice production through competition for nutrients and light. Weeds of the grass, sedge and broad leaf types are common in rice fields. The weeds should be controlled in time to minimize losses in yields. The most troublesome weed in rice is barn yard grass (*Echonochloa sp*) and its morphological features are different from that of rice.

Water Management

The stagnant water in the field improves the availability of nutrients. This water helps to suppress weeds since some weed seeds cannot germinate in submerged conditions and the growth of the weeds that manage to germinate in submerged conditions is retarded. Water stagnation can be achieved where bunding has been done properly.

Pests and Diseases

Many diseases and insect pests attack Rice, like other crops. The diseases that are wide spread in the country are rice blasts and brown spots. Other diseases identified in some areas are rice yellow mottle virus disease, bacterial blight and sheath rot. Outbreaks of armyworms and locusts, which occur in Malawi, destroy rice especially at seedling stage. Weaverbirds (*Quelea quelea*) that occur in swarms attack rice at milky stage and early planted or winter rice suffers serious attack of the birds. Stem borers, gall midges and white grubs destroy rice in the country although their attack is below threshold level.

Harvesting

Early harvesting minimizes losses due over drying in the field and pest i.e. mice infestation. In Malawi, rice should be harvested when 75% of the panicles in the field are golden brown in colour. Rice matures 30 days after 50% flowering stage. Rain-fed rice should be harvested 8-12 days after physiological maturity.

The rice is harvested by cutting the straw with sickles and threshing the panicles by beating them with a small stick. This is done on the mats. Threshed rice is winnowed using flat baskets to remove chaff, broken straw and any foreign matter.

Drying is accomplished by spreading the threshed rice on mats and dry them in the sun for two days. The rice is dried to 14% moisture content.

CONSTRAINTS OF RICE PRODUCTION IN MALAWI

1. Inadequate Irrigation Schemes

The major problem with rice production in Malawi is erratic distribution of rainfall both in time and space since most of the rice is rain-fed. Rice production under irrigation in Malawi is not well developed since there are very few irrigation schemes in the country. The area under irrigated rice is about 7000ha.

2. Inadequate Availability of Improved Seed

Availability of improved rice seed is not enough to satisfy demand for seed in the country and hence most farmers are using over recycled seed with less yields. Early maturing varieties are not available so as to allow farmers to grow three crops per year under irrigation.

3. Poor Marketing Structures and Low Market Prices

The market for rice in the country is not well organized as such farmers sell their rice to middle men who end up making more profit than the growers. The problem is aggravated by lack of transport in the growing areas and farmers cannot afford transport to the urban sector where rice prices are high.

4. Lack of Rice Cooperatives

The farmers are not organized into cooperatives and association for collective bargaining and control of the flow of rice commodity to the market for stable prices. The cooperatives and associations would assist farmers to enjoy economies of scale in purchasing of inputs.

5. High Cost of Inputs

The cost of most inputs is too high for the affordability of the smallholder farmers in Malawi as such inadequate amounts of fertilizers are applied hence lower yields than the varietal potential.

6. Migratory Pests

Outbreaks of armyworms and Weaverbirds tend to threaten rice production in the country.

7. Lack of Training

Training in improved technologies in rice production is lacking in both field staff and rice growers.

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MOZAMBIQUE

CURRENT SITUATATION OF RICE (INCLUDING NERICA) AND ITS VISION FOR THE FUTURE

In Mozambique, rice production is characterized by two large distinct production systems: the family sector (subsistence oriented) and the private sector (commercial oriented). More than 500,000 families are currently involved in rice farming with an average area of 1.1 ha per family, and yield level vary from very low (1.12 ton/ha for the majority) to as high as 4 tons of paddy per ha.

During colonial period, more emphasis was placed by the colonial administration to promote the whole rice production chain through the creation of Rice Development Fund, which assisted only large commercial farmers. The Mozambican government in the post independence period as well, continued to develop large scales farmers through promotion of the state companies and cooperatives. And, for a long time, no emphasis was placed by the government to help small-scale farms until 1998. However, the best way to meet the country's rice demand is to put maximum emphasis on family sector farmers because of (i) the majority of rice growers in Mozambique are small scale farmers, (ii) their average yield is still very low, being 1.12 ton/ha and having a lot of areas for better production.

Annual rice production is approximately 120,000 tons (milled) in a year of good rainfall however the national requirement is 297,600 tons per annum. To fill up the gap some 150,000 – 180,000 tons are imported every year. To meet the overall national requirements, the following points are recommended and some issues are already under implementation by Ministry of Agriculture and Rural Development (MADER) and National Agriculture Research Institute (INIA) in collaboration with other cooperation partners including JICA; (i) rehabilitation of infrastructure (flood control/irrigation facilities, farm roads and bridges), (ii) supply of farm inputs and market support through efficient milling service, (iii) technology development and dissemination to the small holder farmers by powerful research and extension service. In 2003, INIA started a NERICA PVS program in Zambézia and Nampula provinces (central and northern provinces of Mozambique), in collaboration with JICA. And part of these materials are being disseminated in Manjacaze(Gaza province), and in the

near future, some NERICA will be sent to other districts of southern province. As explained here, NERIA PVS trial has just started by INIA recently in collaboration with JICA to evaluate the performance of these varieties in rain-fed rice area of south, central and Northern provinces of Mozambique.

On the other hand, monoculture is the common practice in many rice growing areas of Mozambique in addition that labor for land preparation (and transport of produces) is the biggest constraint to rice growing expansion. To tackle these, JICA HPI (Hyper Project International, American NGO) and other NGOs in conjunction with local government are supporting the promotion of farming system that involves crop diversification (pluses being the major group under promotion after rice), soil improvement and animal traction promotion (much emphasis on water buffalos in Zambezia) in an integrated manner. The pilot project on multipurpose use of water buffalos will be started this year in Nante. Zambezia province, while animal traction test project using cattle has been under way in Chokwe irrigation scheme. We believe that with this farming system approach, rice production will be greatly improved, and many small-holder farmers will have more income raising opportunities.

TANZANIA

Rice Research and Production Promotional Activities in Tanzania

Dr. J. Mbapila

1. ***Rice productivity promoting activities:***

The National rice research sub-programme has been carrying out numerous activities aimed at promoting rice productivity in the country. These include:

- Introduction and evaluation of germplasm for yield and tolerance/resistance to major stresses,
- Breeder seed production of improved rice varieties,
- Germplasm maintenance and characterization,
- On-farm variety trial to enhance farmers' awareness and speed up adoption,
- Fertilizer trials,
- On-farm verification
- Surveying and identification of insect vectors of RYMV,
- Promoting developed technologies in different regions through on-farm variety trials and demonstrations in villages and irrigation schemes, ect.

Achievements:

- Between 2001 and 2003 three local improved rice varieties were released.
- Developed/recommended agronomic packages.
- Identification of two lines which are resistant to RYMV. Some vectors responsible for the transmission of the virus have also been identified.
- With assistance from JICA, KATRIN conducted a Preliminary Yield Evaluation Trial on materials received from WARDA and WITA 8 indicates to be a promising variety warranting promotion for adoption by Tanzanian farmers

Constraints:

- Drought in upland areas and drought and flash flood in rain fed lowland (or inland swamp) areas due to irregular weather
- Infestation of wild rice in the lowland rain fed and irrigated schemes
- Diseases such as Rice Yellow Mottle Virus and blast
- Research has mostly concentrated on irrigated rice due to limited financial resources, etc.

2. Potential of introducing NERICA in Tanzania:

Due to limited financial resources, research has mostly concentrated on irrigated rice. The importance of upland rice and the apparent proportionate land area covered makes it more dependable for household economies. Yields in these areas are disappointingly low (0.4-0.5t/ha) whose reflection has been through high frequencies of household famines in these areas. So, the potential of introduction of new upland rice varieties is very high.

Recently, rice research sub-programme has set strategies to increase production in upland by acquiring NERICA rice varieties from WARDA, which in collaboration with the Farming Systems Research, KATC, the Agricultural Extension service, NGOs and other stakeholders intends to promote.

In future, the activities for the Rice Research Sub-Program will be as follow:

- Variety Improvement
- Agronomy Work
- Plant Protection
- Adaptive research

Not only NERICA but new irrigated rice varieties are also highly expected to be introduced.

UGANDA

CURRENT SITUATION OF RICE AND ITS VISION FOR FUTURE DEVELOPMENT IN UGANDA

George Bigirwa, Cereals Research Program, National Agricultural Research Organization, Uganda

The history of rice growing in Uganda dates as far back as 1904 when it was first introduced by the colonial masters as a crop only to be grown in wetlands or under irrigation. Several varieties were evaluated and most of them were late maturing taking six months, very tall and therefore lodging, the yields too were also very low. Being a crop for growing in the wetlands, this limited the number of farmers to grow it because very few could access wetlands let alone afford irrigation. In 1970s, two main government irrigation schemes (Kibimba and Doho) were established with the support from the People's Republic of China. The main objective was to make Uganda self sufficient in rice. These irrigation schemes have had ups and downs with breakdown of the infrastructure particularly Doho. Kibimba was sold off to a private firm in the late 1990s and the name of the scheme has since then changed to Tilda. From that time to present, a lot of rehabilitation has been done including installation of the state-of- art processing plant and plans are underway to start exporting rice.

The culture of paddy rice growing has since then expanded with over fifteen varieties in production. Farmers in the neighborhood have adopted the technology and this has led to devastation of the wetlands. Destruction and reclamation of wetlands has been done at an alarming rate prompting the government to intervene. One strategy of overcome this, upland rice was introduced. Presently there are four most re-known upland rice varieties. Abilony having been released in 1996, NARIC1, NARIC 2 and NARIC 3 have been released in 2002; the latter is a NERICA variety.

Despite all these varieties on market, rice production in Uganda still does not match consumption. It is estimated that the country spends US $110 million on rice importation annually. The demand is so high in the country because of various reasons like urbanization, change of people's eating habits, rice is easy to cook and store let alone transportation compared to other foodstuffs like cassava, bananas and sweet potatoes.

Uganda is a country which should not be importing rice but instead should be the main regional food basket because of various reasons like: (i) Favorable climate exists. Many crops rice inclusive can be grown twice a year in nearly all districts as opposed to one season in many other countries (ii) High yielding and well adopted varieties are now readily available. NARIC 3, which is a NERICA variety gives 2 to 5 tons per hectare depending on the management. This variety is less than two years since its release but has become so popular that it is almost the only rice variety seed companies are producing because of high demand. The demand is very high because of its good qualities like high yield, semi aromatic, medium maturity of 120 days, resistance to diseases like rice blast, insect pests like African rice gall midge and above all non-shattering characteristics.

Vision

The Government of Uganda in its vision of eradicating poverty among the rural poor who are predominantly small-scale farmers, plans to modernize agriculture by transforming the farmers from subsistence to commercial farmers. Rice and in particular NERICA is such a crop to use in achieving this. The market for the crop is readily available within and out of the country and through sales farmers can improve on their household incomes. The crop also guarantees food security. For the government to achieve this, and rice growing being a new culture, there is need for partnerships with different players e.g. donors, researchers, non-governmental organizations and extension agents in sensitizing, educating farmers and promoting the crop.

ZIMBABWE

RICE PRODUCTION IN ZIMBABWE

In 1981/82 season the nation experienced a rice shortage and, for the first time, people asked why a country with a strong agricultural sector was unable to produce enough rice for its population. This was happening at a time when the public was also particularly aware of the need for judicious use of foreign currency. Thus the importation of rice from Korea eased the shortage but still left the question in people's minds whether such use of foreign currency was justifiable. It is not cheap for Zimbabwe to import rice from Thailand and Malawi, and as a matter of fact now rice is being imported informally and there isn't enough foreign currency to import enough for the whole of Zimbabwe. No wonder rice prices on the market are very high and the common man cannot afford.

The reason rice has not been adopted, as a major cash crop is partly historical but mainly a matter of policy. Government has never actively encouraged the growing of rice to the extent that, up to now, it is one of the "uncontrolled" grains. If the Grain Marketing Board were to establish a marketing scheme for the grain the rural population might easily accept this as a new cash crop since it has the added advantage of also being a good food crop. Farmers still use the inherited varieties, which in spite of their adaptability to the ecosystem, remain unimproved and have a low yield potential. Rice in Zimbabwe is produced on a very small scale, commercially under irrigation in warmer areas, and a subsistence crop under hydromorphic conditions in the cooler and wetter parts of the country. Indeed the rice currently grown in these rural areas is brown rice which may not appeal to the middle class urban consumer who prefers the long grain, white rice. However the better nutritional value of the brown rice might be brought home by a brief campaign by health workers and others particularly for the lower income families who are always pleased to have a change from their daily "sadza" and rice in particular is considered a "special". The work that ARDA is doing in Mzarabani and Jotsholo at present and the research currently being conducted by the Department of Agricultural Research and Extension (AREX) should open the way to large-scale production of rice.

In Zimbabwe, where research on rice has not been done as widely as it should have, there is need for the development of sustainable production systems for the smallholder farmers. Greater diversity through the use of multi line varieties, the use of cover crops or rotation with legume species would ensure efficiency of scale in rice production in the smallholder sector. Greater diversity would also lead to reduced insect and weed problems, improve resource use and greater production stability. Research on wetlands in Zimbabwe has trailed behind mainly because of misconceptions, ignorance, fear to destroy wetlands and the restrictive legislation imposed by the administrators. Very limited research was done on wetlands in the past and the need for gathering information on the management of these ecosystems is obvious and long overdue. It must be realized that, whilst the pieces of legislation are restrictive, their relaxation in the absence of appropriate utilization guidelines based on sound and proven scientific principles would be an act of irresponsibility, which would worsen the current situation.

A wetland cultivation system called Ngwarati cultivation system has been developed in Zimbabwe(Mharapara, 2000). The system comprises of alternating ridges and furrows that hold and guide surface water and facilitate for the cropping of upland crops on ridges and water loving crops in the furrows. It is a system that has been developed based on indigenous knowledge of traditional Shona communities that practiced dambo farming before the colonial error. The guiding principles in the development of a cropping system in dambo environments should include prevention of soil erosion, preservation of soil moisture and free water, soil fertility maintenance, increased productivity and value of the wetland resource and improved livelihoods, (Mharapara et. Al 1998). Mharapara et.al (2001) indicated there is need for developers to think on a larger scale on issues addressing livelihoods systems, the environment and policy in respect to vlei utilization and management, and the need for multidisciplinary teams to be engaged in the dambo development. The Ngwarati cultivation system however was found to be labour intensive hence the need to develop appropriate technologies to reduce the labour constraint.

Production Constraints

According to a survey carried out in Zimbabwe by the Agronomy Institute the main yield limiting factors were found out to be:

- Poor input management
- Yield and quality losses from pests
- Inadequate water supply
- Inefficient use of scarce irrigation water
- Inadequate drainage leading to build up of salinity and alkalinity
- Environmental stresses
- Use of unimproved varieties

Since most rain-fed lowlands depend on erratic rainfall, conditions are diverse and unpredictable. Understanding how farmers' practices help reduce risk and assure some production is essential to developing improved technologies for rain fed lowlands. Most rain-fed lowland farmers are poor and must cope with unstable yields and financial risks. They adapt their cropping practices to the complex risks, potentials and problems they face. They typically grow traditional, photoperiod sensitive cultivars and invest their labour instead of purchasing inputs. Farmers employ no apparent water conservation measures. They weed, may redistribute seedlings to ensure good crop stands and harvest by hand. Suitable modern varieties and associated production technologies have been limited.

Although new technology developed in the 1970s and 1980s focused on the irrigated sector, rain-fed lowland farmers were not forgotten. Researchers have tried to produce new varieties and improved farming practices for nutrient management, crop establishment, on-farm water collection and weed and pest control. These practices can potentially contribute to high yields, especially in rain-fed sub-ecosystems. Rain-fed lowland rice farmers in less favourable areas use traditional varieties that do not respond well to high fertilizer rates.

Current Research in Zimbabwe

In Masvingo – Mushagashe, Gutu- Chartsworth and some parts of Zimuto, however, adoption of new rice varieties is increasing as scientists are evaluating varieties adapted to rain-fed low land stresses. Rain- fed low land rice varieties of the future

will need to respond to improved management while retaining the tolerance of the traditional varieties for drought and soil stresses.

Upland rice is grown mostly in Manicaland province. Landforms in this province for upland rice vary from low-lying valley bottoms to undulating and steep sloping lands with high run off and lateral water movements. Dry soil preparation and direct seeding in fields are common. Surface water does not accumulate for any significant time during the growing season.

Rice research in the lowveld dates back to the 60s. The trials were conducted at Chiredzi Research Station, Chisumbanje Experiment Station and Middle Save Experiment Station that form the Lowveld Research Stations. Other trials were conducted on-farm at Mshagashe and Chartworth by Agronomy Institute.

Variety Trials

Evaluation of a number of rice varieties brought from different countries through West Africa Rice Development Association (WARDA) was done at the Lowveld Research Stations. The varieties included the short, medium and the long duration types. From all the varieties tested only four were found to be well adapted to the local conditions and these included Mhara 1, Mhara 2, Mhara 3 and Mhara 4 and these happen to be short duration varieties. These have since been multiplied and distributed to farmers.

A set of 22 cultivars and lines obtained from WARDA have been under test in preliminary variety trials at four sites in Masvingo Province in 2002/03 season. These included two accessions of Oryza glaberrima, three cultivars of O. sativa and a number of O.glaberrima x O. sativa hybrids. The entries were divided into two groups with each group having 11 entries and the farmer's own seed planted in a single plot of three 5m long rows at each of the four sites. The rice was planted ahead of the rains in early September under hydromorphic conditions with the water table near or at the soil surface. Two of the sites were used for farmer group evaluation during the vegetative stage at 90 days after sowing. Farmers inspected the plots individually and then later came together to complete the matrix ranking as a group. The farmers agreed that a useful cultivar should possess the following traits:

- Early maturing
- Resistance to shattering
- Resistance to bird damage
- Drought resistance

Table.1 shows the ranking of the varieties done by farmers in Mshagashe where they ranked WAB 878-6-12-1-1P1-HB as their favorite and this cultivar was characterized by large seed, high yield, early maturing, no shattering, drought resistance and finally bird resistance since it possesses awns. The second and third best entries wereWAB-450-11-1-2-PH1-HB and WAB 881-10-37-18-25-P3-HB. The farmers' local variety was not scored so favorably as it is very susceptible to shattering and farmers lose a considerable proportion of the potential yield. The top four lines selected by farmers include "mupunga muchena", white seeded types (WAB 878-6-12-1-1-P1-HB and WAB 450-11-1-2-PH1-HB) and these will be suitable for commercial production and "mupunga mutsuka) a yellow/brown type (WAB 881-10-37-18-25-P3-HB) with big bold grains which may be more suitable for local sales. At Chatsworth the conditions

were drier with less soil moisture retention as a result a number of lines flowered during December/January drought resulting in sterility and the following lines were badly affected and these are CG20, WAB 878-6-37-5-6-P1-HB, WAB 878-6-20-1-1-P3-HB and WAB 878-6-37-8-3-P1-HB (Table.2)

Nitrogen Levels

Four traditional varieties namely MC 14, Chidziva, CZ 03 EX Bikita and MC 12 EX Nhau were tested at different nitrogen levels together with an improved variety Mhara 4. The fertiliser levels were 0, 50, 100, 150 and 200kg/ha N. The results showed no significant differences in yield and other attributes but however at 150kg/ha N and above there was lodging. The number of panicles/m^2 were independent of the amount of nitrogen applied in the different treatments.

Seed Rates

Different seed rates and population trials were conducted to find out the optimum seed rate that farmers can use without incurring extra expenses for no incremental benefit. The recommended seed rate is 90kg/ha from trial run in the 1982/83 season. Seed rates of 140kg/ha appeared to be unnecessarily high, but it had no detrimental effect on yield. Low seed rate of 40kg/ha proved to be too low (Lowveld Research Station Summer report, 1981-3.

Irrigation methods

Paddy irrigation proved far superior to the flood system irrespective of irrigation interval (Lowveld Research Station summer report 1972/73 and 1974/75) The main factors contributing to high paddy irrigation yields were the number of grains per panicle, the percentage of filled grain, weight of grains per panicle and 1000 seed weight. The paddy rice was the most efficient producer of grain. There was a trend for yield to decline with increase in the evaporation deficit i.e irrigation deficit of 40mm. 60mm and 80mm. The paddy treatment yielded 8 999kg/ha whilst other treatments ranged from 5707kg/ha to 6493kg/ha with 80mm evaporation deficit having the lowest.

Table.1 Summary of farmer assessment of rice cultivars tested at Mshagashe Farm 173

Position	Plot	Entry	Farmer assessments
1	3	WAB 878-6-12-1-1-P1-HB	Large seed ,high yield, early maturing, no shattering, drought resistant, bird resistant(awns)
2	9	WAB 450-11-1-2-PH1-HB	Early maturing, high yield
3	6	WAB 881-10-37-18-25-P3-HB	High yield, resistant to shattering
4	8	Iguape Cateto	High yield potential although later maturing
4	10	WAB 450-1-B-P-65-h-1	High yield potential although later maturing
6	12	Farmers' retained seed	Late maturing, shatters, susceptible to bird damage
7	1	CG 14	Early maturing, small seeded, lodges, shatters
8	4	WAB 878-6-27-17-2-P1-HB	Early maturing, low yield, some shattering
9	5	WAB 878-6-27-17-3-P1-HB	Early maturing, low yield, thin seed , not drought resistant.
10	11	WAB 450-1-B-P-157-2-1	Very late maturing
11	7	LAC 23	Very late maturing, not liked by farmers
11	2	Suakoko 8	Very late maturing, not liked by farmers

Table.2 Observation on the state of lines at Chatsworth at approx. 160 after sowing

Plot	Line	Observations
1	WAB 878-6-37-5-6-P1-HB	Drought stressed, short, early flowers sterile, now producing some grain
2	WAB 878-6-20-1-1-P3-HB	Drought stressed, short, early flowers sterile, now producing some grain
3	WAB 878-6-4-2-P1-HB	Vigorous, high tillering, early flowers sterile
4	WAB 878-6-37-8-3-P1-HB	Very short, mostly sterile from early flowering in drought
5	WAB 881-10-37-18-14-P1-HB	Vigorous, high tillering, early flowering but sterile, new flowers
6	WAB 880-1-38-18-2-P2-HB	Early flowers sterile, growing away from drought with new flowers
7	WAB 880-1-38-18-2-P2-HB	Vigorous, many heads now maturing and new flowers, good yield
8	WAB 880-1-38-20-26-P1-HB	Best line here, tall, vigorous, large white grain, high yield.
9	WAB 480-1-1-1-P31-HB	Short, high tillering and vigorous, early flowers sterile but now profuse flowering- drought resistant
10	WAB 480-1-B-P-38-HB	Short, high tillering,early flowers sterile but now most plants at anthesis, good potential, drought resistant
11	CG20	Good early vigour and tillering but flowered early during drought so all flowers sterile, no grain at all-lodges
12	Farmers' local	Good vigour in vegetative stage, tall but as yet not at 50% flowering. Early heads sterile, those with grain shattering.

Annex-3

Matrix of the Questionnaire for Round-Table Discussion (Group-A & Group-B)

Matrix Group-A

Basic Information for the Round Table Discussions (Group A)

Country: Guinea

		Rank of rice in cereal crops	Self-sufficiency rate (amount of rice imported)	Total cultivated area of rice (ton)	Share in area: irrigated, rainfed, wetland and upland (%)
Present condition		1st rank	229.500 tons (60%)	665.637 ha	-mangrove=31.638ha (2.5%) -Bas-fond=141.995ha (10.5%) -Plains=209.867ha (15.5%)
Issue		Good practice	Good assistance	Possible approach	Activities/vision on NERICA
1	Research and Technology Development	-Seed production -Post harvest services	-Lack of finances	Greater financial support by the government and by private sector	-PVS -Production of (loan) seeds -Post-harvest -Improvement of production system
2	Availability of inputs (seed, etc.)	No	Quite good (CBSS, SG2000 …)	-SPSC(promotion) -Promotion of inputs -Credit facilities	-Production of seeds -Promotion of commercialization -Support of private sector
3	Dissemination/ extension and training	No (Training programs by NGO)	Fairly good	-Promotion of SPSC -Capacity building -Partnership of stake-holders (NGO, farmers, private sector)	-Formation of organizations of farmers -Production and promotion of seeds -Provide funds
4	Post harvest processing and marketing	Fairly good -Need to promote marketing -Formalize farmers groups	No (IFAD, SG2000)	-Promotion of partnership with private sector -R/D	-Capacity building -Credit facilities -Appropriate training
5	Other important issues	No -Capacity building -Market studies	No	-Organization of seed-production mechanisms -Need for larger market	-Need to enlarge market -Efforts to increase commercialization, improve conservation and storage of seeds

Basic Information for the Round Table Discussions (Group A)

Country: Gambia

		Rank of rice in cereal crops	Self-sufficiency rate (amount of rice imported)	Total cultivated area of rice (ton)	Share in area: irrigated, rainfed, wetland and upland (%)
Present condition		3rd after	12%	15,700 ha	Irrigated: 14%; upland: 57%; wetland: 57%
Issue		Good practice	Good assistance	Possible approach	Activities/vision on NERICA
1	Research and Technology Development	Mainly adaptive but limited by severe resource constraints	Very limited assistance	Capacity development for improved programme development to attract donor assistance	
2	Availability of inputs (seed, etc.)	Dry season irrigated conditions, best for seed production, but resource constraints severely limits availability of seeds.	Necessity to establish a good dry season irrigated seed multiplication programme.		
3	Dissemination/ extension and training	Severe resource constraints but structure in place	Very limited assistance	Capacity building, provision of resource support	
4	Post harvest processing and marketing	Still rudimentary development of appropriate technology needed	Very limited assistance	Capacity building for development of appropriate technology	
5	Other important issues	Development of sustainable irrigated rice production; development of farmer organization	Require capacity development Watershed management project by ADB and IFAD.	Require capacity development	

Basic Information for the Round Table Discussions (Group A)

Country: Ghana

		Rank of rice in cereal crops	Self-sufficiency rate (amount of rice imported)	Total cultivated area of rice (ton)	Share in area: irrigated, rainfed, wetland and upland (%)
Present condition		2nd rank after maize	Less than 50% 230,000 ton	122,700 ha	Irrigated: 16%; rainfed: 78%; upland 6%
Issue		Good practice	Good assistance	Possible approach	Activities/vision on NERICA
1	Research and Technology Development	Varietal selection and promotion of crop technologies and water management	JICA	Training of all MOFA extension staff in rice production areas	Further screening by research institutes
2	Availability of inputs (seed, etc.)	Seed producers trained and certified	JICA, UNDP, FAO	Linking SSIAPP with SPFS, research institutions and farmers	Stock seed to be produced; Further multiplication by seed producers
3	Dissemination/ extension and training	Guidelines for technologies under preparation	JICA, FAO, AFD	Inter secto… and institutional collaboration	SPFS for systematic dissemination and extension and training
4	Post harvest processing and marketing	Investment by big warehouses, paddy storage, processing and marketings	Support from banks and guarantee by government	Direct linkage and collaboration between farmers and bulk processors	Support to marketers for quality improvement
5	Other important issues				

Basic Information for the Round Table Discussions (Group A)

Country: Nigeria

		Rank of rice in cereal crops	Self-sufficiency rate (amount of rice imported)	Total cultivated area of rice (ton)	Share in area: irrigated, rainfed, wetland and upland (%)
Present condition		4th after sorghum, millet and maize	64% (1.8 million ton)	1.9 million ha	Irrigated: 8%; rainfed upland: 47%; rainfed lowland: 40%; deepwater rice: 4%; mangrove swamp: 1%
Issue		Good practice	Good assistance	Possible approach	Activities/vision on NERICA
1	Research and Technology Development	Presidential initiative on rice production and export -2001	National agricultural research project (1993)	Improvement of funding for research	2 NERICAs are released in 2003. The NERICA seeds to be produced in 2004.
2	Availability of inputs (seed, etc.)		Japanese assisted special rice project SPFS (2001)	Making available rice production inputs Improving extension services.	Use of green manure
3	Dissemination/ extension and training		Research, extension, farmer, input linkage system (REFILS) strengthening	Improve funding of extension services	Monthly technology review meetings (MTRM). Adopted village approach Training the trainer programme
4	Post harvest processing and marketing		National agricultural research project (NARP) – processing technology development (1993-1998) SPFS (2001-2006)	Encouraging formation of cooperative groups Encouraging companies and wealthy individuals to invest in rice processing	Guaranteeing of soft agric. loans for rice farmers' groups and individuals for cottage processing.
5	Other important issues				

Basic Information for the Round Table Discussions (Group A)

Country: Niger

		Rank of rice in cereal crops	Self-sufficiency rate (amount of rice imported)	Total cultivated area of rice (ton)	Share in area: irrigated, rainfed, wetland and upland (%)
Present condition		3rd after millet and sorghum	One third of the needs (about 30%)	19.500 ha	-irrigated rice= (41%) -lowland rice= (51%) -Rain fed rice= (8%)
Issue		Good practice	Good assistance	Possible approach	Activities/vision on NERICA
1	Research and Technology Development	-Two harvest per annum -Varieties: . Tolerant to RYMV (WITA8, WITA9) . Stable (IRIS29-680-3, BG90-2, D5237) -Evaluation of intra and inter original forms of irrigated rice -Technical itinerary (from nurseries to harvest)	-ADRAO/WARDA	PVS (use of selected varieties)	- Evaluation of intra and inter original forms, specific to irrigated rice -Test NERICA1 in Gaya (furure)
2	Availability of inputs (seed, etc.)	-Existence of a seed production farm and a network of support personnel -Use of chemicals to weed (londax)	Belgian cooperation	-Credit facilities to those involved	-Increased production of seeds -Training for those involved
3	Dissemination/ extension and training	-Demonstrations and tests (based on the choice of farmers) -Increased production of seeds -Training	European Union	-PVS - Research -PVS – Extension services -Reform of land management system	-Tests -Demonstrations -Training
4	Post harvest processing and marketing	-Manufacturing -Intense involvement of women in practical aspects of rice production		-Promotion of small scale production -Credit facilities to those involved in commercialization	
5	Other important issues	-Existence of potential irrigable land (270,000ha) -Existence of a national irrigation strategy			

Basic Information for the Round Table Discussions (Group A)

Country: Côte d'Ivoire

		Rank of rice in cereal crops	Self-sufficiency rate (amount of rice imported)	Total cultivated area of rice (ton)	Share in area: irrigated, rainfed, wetland and upland (%)
Present condition		First (1st)	48% (2001)	600 000 ha (2001)	Area Production level -irrigated rice= (4%) -lowland rice= (6%) 6% -rain fed rice= (90%) 80%
Issue		Good practice	Good assistance	Possible approach	Activities/vision on NERICA
1	Research and Technology Development	-Restarting, after a long period of hibernation	-Yes, with WARDA		-Agro and pita-sanitary characterization of traditional varieties of rice -Improvement of agronomical performance capacity of different varieties of rice -Supply of seeds (including NERICA) -Accurate keeping of records
2	Availability of inputs (seed, etc.)	None in general; except in irrigated areas; because of the high cost involved	None		-To increase production of NERICA -There are arrangements to produce NERICA seeds this year (2004) (100 ha)
3	Dissemination/ extension and training	Yes	Yes In form of national assistance to producers		
4	Post harvest processing and marketing	None	None	-Organize working networks	Make and use better adapted threshing equipment
5	Other important issues				

Basic Information for the Round Table Discussions (Group A)

Country: Madagascar

		Rank of rice in cereal crops	Self-sufficiency rate (amount of rice imported)	Total cultivated area of rice (ton)	Share in area: irrigated, rainfed, wetland and upland (%)
Present condition		First (1st) cereal crop	185,000 tons of importation (in 2001)	1 216 000 ha (in 2001)	-irrigated rice =(0%) -lowland rain fed = (81%) -Highland rain fed= (19%)
Issue		Good practice	Good assistance	Possible approach	Activities/vision on NERICA
1	Research and Technology Development	-Research -Dissemination of improved varieties, which are more productive and well adapted to each region	-Technical cooperation (IRAD, World Bank, IRRI, USAID, CEE, FAC, FAO, NORAD)	-Financial resources -Technical partnership	-Increased production of seven varieties of NERICA -Tests to enable selection of varieties
2	Availability of inputs (seed, etc.)	-Importation of tax-free inputs (seeds, fertilizers, agricultural equipment -Existence of a center for multiplication of seeds	-Japanese donations (KR1, KR2) -JICA; Project of manufacturing agricultural materials locally	-Technical and financial assistance -Participation of groups of farmers in see producing activities	-Dissemination of seeds that are adapted to different regions
3	Dissemination/ extension and training	-Existence of training centers -Formation of groups/organizations of farmers up to village level	-Agricultural credit (by a french company called *Crédit Agricôle*) -External internship/training	-Partnership between public and private sectors -Development of hydro-agricultural infra-struture	-Testing of seeds in different ecological zones, with the collaboration of farmers
4	Post harvest processing and marketing	-A revolving system based on JICA agricultural materials	-Agricultural finance	-Technical and financial assistance -Re-organization of marketing strategies	
5	Other important issues	-Increase of rice growing area and yield	-Financial support to anticipated activities -Technical support	-Implementation of strategic document on poverty reduction (DSRP)	-Increase and intensify production of rain fed rice

Basic Information for the Round Table Discussions (Group A)

Country: Mali

		Rank of rice in cereal crops	Self-sufficiency rate (amount of rice imported)	Total cultivated area of rice (ton)	Share in area: irrigated, rainfed, wetland and upland (%)
Present condition		Third (3rd cereal crop), after millet and maize (4% of GDP)	82,000 tons of imported (National production =52,000)	465,898 ha	-irrigated rice=7825ha hybrid(17%) -lowland rain fed = 266,656(57%) -Wetland rice=120,991 ha (16%)
Issue		Good practice	Good assistance	Possible approach	Activities/vision on NERICA
1	Research and Technology Development	-Variable creations	-Varied selections -Conception of better technology -Strengthening of technological and material capacities	-PVS -Tests in the areas of the farmers -Research at the station -Laboratory work	-Complementary technology -Increase varieties of NERICA -Capacity building
2	Availability of inputs (seed, etc.)	-Basic planting seeds from which to produce others	-Production of basic planting seeds -Production of seeds (support to producers)	-Production of basic planting seeds -Production of planting seeds for the community by local producers	-Intensification of production of planting seeds -Production of planting seeds for the community at large
3	Dissemination/ extension and training	- Organizations of farmers/producers	-Training -Support to organizations -Acquisition of inputs	-Training -Organization of farmers -Capacity building -Motivation to produce more and more	-Training on innovative approaches (production of seeds at community level, etc., involvement of all the stake-holders: PO, NGOs, private and public sectors)
4	Post harvest processing and marketing	-Organize stake-holders	-Organizations of stake-holders -Credit facilities	-Necessary equipment to stake-holders -Training	-Research on post-harvest technology
5	Other important issues	-Coordination	-Support to coordination structures (national and regional level)	-Improvement of existing infra-strures	-Improvement of existing infra-strutures not only at national level, but also at regional level, in order to coordinate dissemination activities better and improve technology

Basic Information for the Round Table Discussions (Group A)

Country: Senegal

		Rank of rice in cereal crops	Self-sufficiency rate (amount of rice imported)	Total cultivated area of rice (ton)	Share in area: irrigated, rainfed, wetland and upland (%)
Present condition		- 4th after millet and sorghum and maize -Rice is 15% of total cereal production volume of the country	(18 -20%)	(80 000 – 85 000 ha)	-irrigated rice= (30%) -wetland rice= (15-20%) -rain fed rice= (40%) -upland rice=(10-15%)
Issue		Good practice	Good assistance	Possible approach	Activities/vision on NERICA
1	Research and Technology Development	-Improvement of varieties -Technical itinerary	-Trials in a variety of localities	-Participative approach -Organize workshops for producers	-Identify, validate et disseminate the best varieties of NERICA (screening) -Technical itinerary
2	Availability of inputs (seed, etc.)	-Existence of the basic genetic materials required in main speculations -Production of basic requirements	Support to organizations and to farmers in order to increase seed production and have a better seed management	"	-Produce basic seeds required for multiplication of planting seeds in large quantities
3	Dissemination/ extension and training	-Existence of a national structure for transfer of appropriate technology	Assistance is well spread, in order to support farmers of the whole national territory	"	-Support producers of seeds in order to increase certified seeds -Capacity building and increased sense of accountability as regards producers
4	Post harvest processing and marketing	-Acquisition of the required post harvest equipment and other preparation means	"	"	Make and use better adapted thrashing equipment
5	Other important issues				

Matrix Group-B

Basic Information for the Round Table Discussions (Group B)

Country: Ethiopia Name:

		Rank of rice in cereal crops	Self sufficiency (amount of rice imported)	Total cultivated area of rice (ha)	Share of irrigated rice, Rain fed rice, wetland rice, upland rice (%)
Present condition		8th 0.17 % of cereal production	Very small amount	8,000ha	Almost all are wetland rice
Issue		Good practice	Good assistance	Possible approach	Activities/Vision on NERICA
1	Research and Technology Development	NERICA multi-vocational trials started in 21 sites.	JICA and SG2000 assist the activities.		Further research is needed.
2	Availability of Input (seed, etc.)	Seed was imported from Guinea	SG2000 assisted it.		
3	Dissemination /Extension and Training	Some researchers and engineers were sent to Guinea and Uganda for training	SG2000 and JICA financed the training.		Researchers, engineers and farmers training is needed.
4	Post-harvest processing and Marketing	Manufacturing of machinery is on the trial stage.	SG2000 is assisting it		Information of good machines is needed.
5	Other Important Issues. Specify: (Capacity building through training of Researchers and extensions				Coordination of various organizations is important.

Basic Information for the Round Table Discussions (Group B)

Country: Kenya Name:

		Rank of rice in cereal crops	Self sufficiency (amount of rice imported)	Total cultivated area of rice (ha)	Share of irrigated rice, Rain fed rice, wetland rice, upland rice (%)
Present condition		3rd after Maize and wheat.	110,000 tons imported on average.	Irrigated 11,000 ha Ranged 15,000ha	Irrigated 75% Wetland 9% Upland 15%
Issue		Good practice	Good assistance	Possible approach	Activities/Vision on NERICA
1	Research and Technology Development	To involve farmers, cooperative, millers and all stakeholders in research	Research/extension involvement with farmers in production and technology generation	Participatory variety selection (PVS) Participatory Rural Appraisal (PRA) Collaboration and networking	Continue evaluation of NERICAs for adptability. Import of NERICA germplasms.
2	Availability of Input (seed, etc.)	Need to stimulate the private sector in seed and other inputs provisions	More subsidies are initially advanced to farmers	Muli-sector approach to seed multiplication and distribution. Credit facility from private sector	Effective system of seed multiplication and distribution. Efficient input supplies to increase productivity.
3	Dissemination /Extension and Training	Extensive work with all extension agencies in technology transfer.	Requires donor support.	Strong research, extension and farmers linkages on farm demonstrations and capacity building. Workshops & seminars for extension, farmers and support staff.	Increased adoption rate of 40%.
4	Post-harvest processing and Marketing	Increase utilization of rice and rice products	Requires donor support in acquisition of micro-processing machines.	Encourage establishment of micro-processing rice mills. Increase utilization of rice by products	Reduce rice imports. Increase exports.
5	Other Important Issues. Specify: ( )				

Basic Information for the Round Table Discussions (Group B)

Country: Malawi Name:

		Rank of rice in cereal crops	Self sufficiency (amount of rice imported)	Total cultivated area of rice (ha)	Share of irrigated rice, Rain fed rice, wetland rice, upland rice (%)
Present condition		Second to Maize		57,166 ha	Rain-fed Rice 88% Irrigated 12%
Issue		Good practice	Good assistance	Possible approach	Activities/Vision on NERICA
1	Research and Technology Development	Cross breeding programs to improve local varieties.		After screening more field trials should be done rather than confining to research stations	Seed was issued to farmers through SG2000 for upland trials Cross breeding being done with local varieties in order to acquire NERICA traits.
2	Availability of Input (seed, etc.)	Locally multiplied certified seed available from Lifuwu Research Station		More NERICA varieties should be made available to Malawi for seed multiplication in all rice growing areas	IDP91hb, IDP38hb, IDP28hb, BB-8, NERICA varieties been multiplied at Lifuwu Research Station Salima, Malawi.
3	Dissemination /Extension and Training	Crop production messages formulated conduction of on-farm demonstration plot through government efforts agri-communication station.	Farmer training conducted by TZ experts through JICA sponsorship at Bwanji Rice Scheme.	To acquire more knowledge about NERICA varieties	Not much has been done but NERICA IDP38hb has performed well in our initial research trials.
4	Post-harvest processing and Marketing	Low cost technology by using a pickel and rice is sun dried after harvesting. Panicles are hit with a small stick	4 rice mills provided by JICA and stationed at Bwanse Valley irrigation scheme. Through other donors providing machines have been bourht for Lifuwu, Hara, Domasi schemes. Taiwanese and Japanese assistance.	Farmers to form strong cooperatives and acquire their own appropriate rice mills	To satisfy domestic regional markets and beyond.
5	Other Important Issues. Specify: ( )	Rice could be a cash crop. Good expert potential to Zimbabwe and beyond.			Sasakawa Global 2000 is no longer facilitating NERICA seed multiplication. They are continuing with existing varieties.

Basic Information for the Round Table Discussions (Group B)

Country: Mozambique Name:

		Rank of rice in cereal crops	Self sufficiency (amount of rice imported)	Total cultivated area of rice (ha)	Share of irrigated rice, Rain fed rice, wetland rice, upland rice (%)
Present condition		3rd	200,000 tons	200,000ha	Irrigated 3% Upland 7% Rain-fed Lowland 90%
Issue		Good practice	Good assistance	Possible approach	Activities/Vision on NERICA
1	Research and Technology Development	Availability of modern varieties; Rice Board recently formed		Link of different components fo the value chain (research, extension, production, processing and marketing)	not yet developed
2	Availability of Input (seed, etc.)	Existence of foundation and certified seed system Agricultural promotion fund for production of certified seed for most crops		Establishment of business dealers of farm inputs.	
3	Dissemination /Extension and Training	Ministry of agriculture Rice Board PROAGRI	SG2000, Special Program for Food Security (SPFS), 60-70 NGO's currently active.	More assistance to rice milling factories	
4	Post-harvest processing and Marketing	ORAM (local NGO)	World Vision International CARE	Acquisition of small milling machines	
5	Other Important Issues (RiceMarket)				

Basic Information for the Round Table Discussions (Group B)

Country: Tanzania Name:

		Rank of rice in cereal crops	Self sufficiency (amount of rice imported)	Total cultivated area of rice (ha)	Share of irrigated rice, Rain fed rice, wetland rice, upland rice (%)
Present condition		Second to Maize	45,000 MT in 1981 191,000 MT in 2000	460,389 ha 577,960 production	Irrigated rice 10%, Rain-fed rice 70%, wetland rice 0% upland rice 20%
Issue		Good practice	Good assistance	Possible approach	Activities/Vision on NERICA
1	Research and Technology Development	Evaluation for field screening for stress identification of RTMV vectors. Herbicide screening	TARPII, DANIDA JICA for NERICA	Standardization of research procedures, PYT, MYT. Strengthen research facilities.	Standardization of research procedures. PYT, MYT, screening procedures.
2	Availability of Input (seed, etc.)	On-farm seed production. Production Seed farms	DANIDA	Irrigation infrastructure for seed production. Credit for inputs to farmers.	Availability of new NERICA seeds
3	Dissemination /Extension and Training	On-farm demos. Agricultural shows. Training of farmers, and VEOs.	Training farmers and VEOs at KATC.	Continued training at KATC and others.	PVS in place by WARDA should speed up.
4	Post-harvest processing and Marketing			Storage facilities Publicity (eg. leaflets)	Evaluation of cooking and ensuring quality.
5	Other Important Issues (Taxation)	Duty free for agronomic machinery.			

Basic Information for the Round Table Discussions (Group B)

Country: Uganda Name:

		Rank of rice in cereal crops	Self sufficiency (amount of rice imported)	Total cultivated area of rice (ha)	Share of irrigated rice, Rain fed rice, wetland rice, upland rice (%)
Present condition		3rd in production, 2nd in consumption	480,000 MT most imported	125,000ha	irrigated 60% rain-fed 1% wetland 9% upland 30%
Issue		Good practice	Good assistance	Possible approach	Activities/Vision on NERICA
1	Research and Technology Development	Identification and release of NERICA variety which is now on market	Funding from Rockefeller Foundation but has ended. Germplasm from WARDA	Priority Crop, partnership with donors, NGOs and extension. More funding	More germplasm evaluation (PVS) with farmers.
2	Availability of Input (seed, etc.)	Seed production still low	Seed companies trying, but need to involve farmers.	Farmer-to-farmer seed production (CBOs)	community seed production
3	Dissemination /Extension and Training	Not enough	Collaboration	Field Days Demonstration shows.	Training Production of guides and manuals
4	Post-harvest processing and Marketing	Few milling machines	Training in post harvest handling and processing. Modern millers	Scale-up training. Available simple tools and equipment	
5	Other Important Issues				

Basic Information for the Round Table Discussions (Group B)

Country: Zambia Name:

		Rank of rice in cereal crops	Self sufficiency (amount of rice imported)	Total cultivated area of rice (ha)	Share of irrigated rice, Rain fed rice, wetland rice, upland rice (%)
Present condition		5th (1.1%) 2001	Production: 8,000ton Import: 14,000ton	9,270ha (2001)	n.a.
Issue		Good practice	Good assistance	Possible approach	Activities/Vision on NERICA
1	Research and Technology Development				To conduct field trials in local condition.
2	Availability of Input (seed, etc.)				
3	Dissemination /Extension and Training	Necessary to increase rice consumption. Necessity to improve to get access to the market.	Extension of irrigation practice (Zambia Initiative) Sefura Rural Development Program	Market Survey	
4	Post-harvest processing and Marketing	Necessity to get information about rice market		Market Survey	
5	Other Important Issues			Infrastructure rehabilitation of rural feeder road.	

Basic Information for the Round Table Discussions (Group B)

Country: Zimbabwe Name:

		Rank of rice in cereal crops	Self sufficiency (amount of rice imported)	Total cultivated area of rice (ha)	Share of irrigated rice, Rain fed rice, wetland rice, upland rice (%)
Present condition		6th Very miner crop	98% imported	850ha	Upland mostly. Some wetland.
Issue		Good practice	Good assistance	Possible approach	Activities/Vision on NERICA
1	Research and Technology Development	PVS on-going.	Research capacity good.	Raise priority status of rice.	NERICA is not yet tested in Zimbabwe
2	Availability of Input (seed, etc.)	Traditional farmers varieties available. Hybrids needed	Inadequate input availability.	Need to push for a national policy promoting rice production.	NERICA seed to be sourced.
3	Dissemination /Extension and Training	Good (Strong in developing technology)	Available	Promote rice production using already tested and adopted varieties.	Strong extension agency
4	Post-harvest processing and Marketing	Processing and marketing facilities poor		Market research required. Move for ban on rice imports.	Training available.
5	Other Important Issues	Aggressive promotional policy required.	Request for NERICA germplasm for PVS work.	Technical Cooperation Program to he4lp finance rice testing.	PVS fertilizer testing and trials. Seed rates.

Annex-4

Result of Questionnaire for the whole Seminar

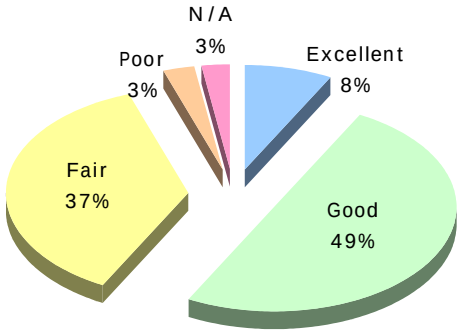
Result of Questionnaire

-Seminar on Promotion of Rice Production and Dissemination in Africa-

Nairobi, Kenya, 10-11 February 2004-

1. Session 1 / Agricultural Development and Rice Cultivation

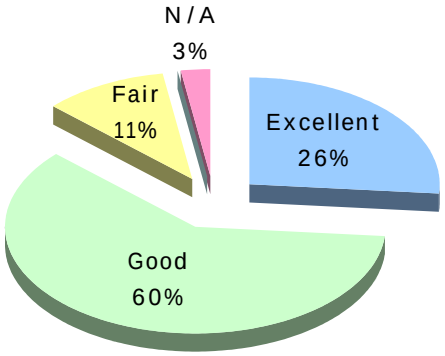
1.1. Time Allocation:



Comments:

- The time is too limited.
- Needed more time to enable participants to share information and experiences in NERICA rice; however, overall it was successful.
- No adequate time for the discussion.
- Presenter should be informed to stick to time allocated and spare time for questions.
- Planned schedule should be shorter.

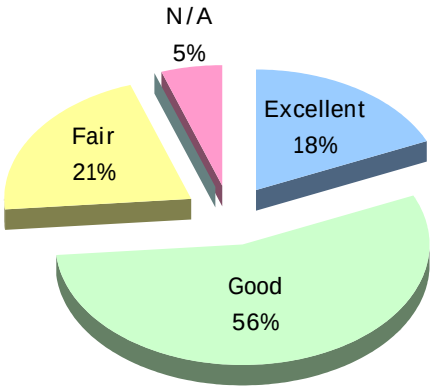
1.2. Presentation Material / Skill



Comments:

- Better to summarize than going word by word.
- Presenter tended to read the text.

1.3. Contents

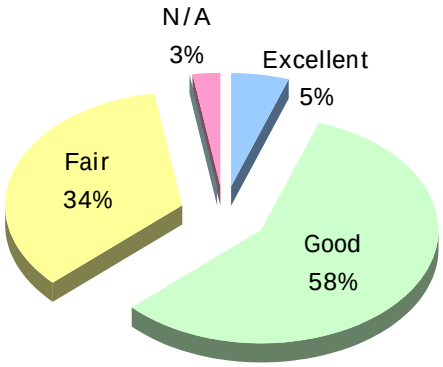


Comments:

- The resource persons were right and prepared their contents very well.
- Very informative information and experiences.
- Too general in scope.

2. Session 2 / Agricultural Development Projects by JICA

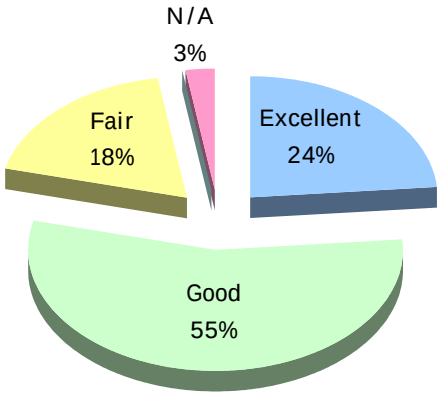
2.1. Time Allocation



Comments:

- Planned schedule should be shorter.

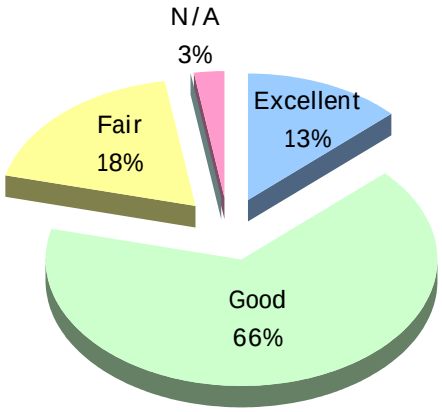
2.2. Presentation Material / Skill



Comments:

None

2.3. Contents

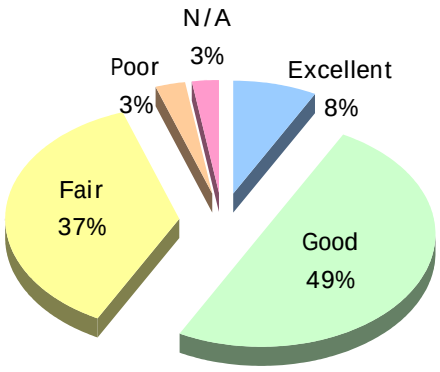


Comments:

- Raised expectations as is how pilot projects can be designed and expanded.
- Presentation and discussion gave good insight into JICA projects.
- The presentation reflects the in depth holding of the center part stuff and NERICA of equipments.

3. Session 3 / NERICA

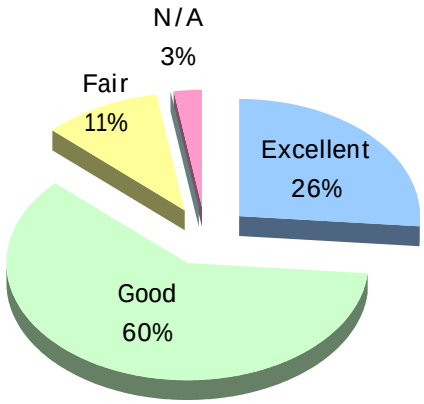
3.1. Time Allocation



Comments:

- Time given was too short for such an interesting issue.
- Planned schedule should be shorter.
- Too much time consumed for a certain presentation

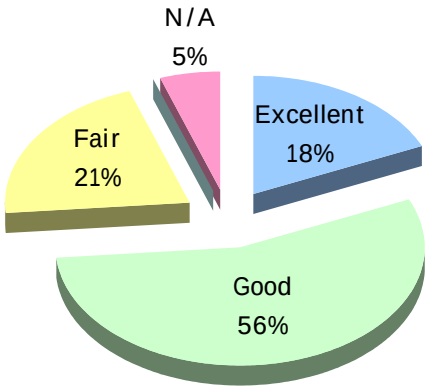
3.2. Presentation Material / Skill



Comments:

None

3.3. Contents

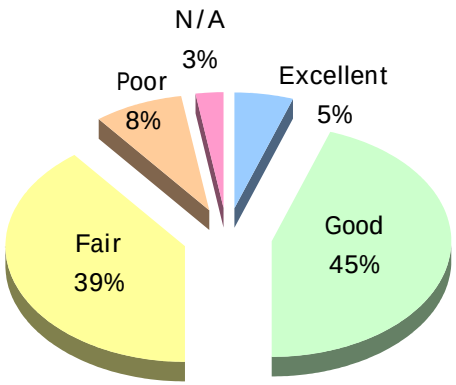


Comments:

- Quite impressive and appetizing for non-pilot countries.
- More information should be made available to eastern and southern African states.
- There should be more enlightenment on the varieties of NERICA suitable for a particular ecological environment.
- Well balanced information on NERICA.
- Should lead to greater innovation of rice.
- Experience of all countries with NERICA, better, if presented on the forum.
- Much more projects is necessary

4. Round Table Discussion

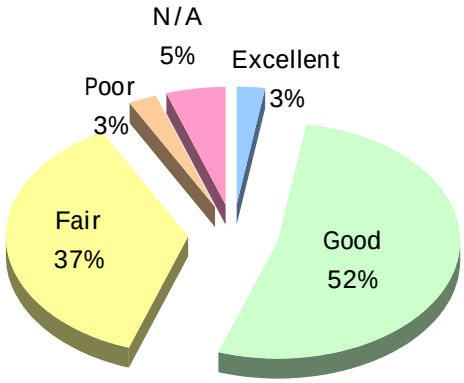
4.1 Time Allocation



Comments:

- More time should have been allocated for countries to shed more light on their various agricultural problems.
- Should have been given more time for more issues and to come up with a wax forward.

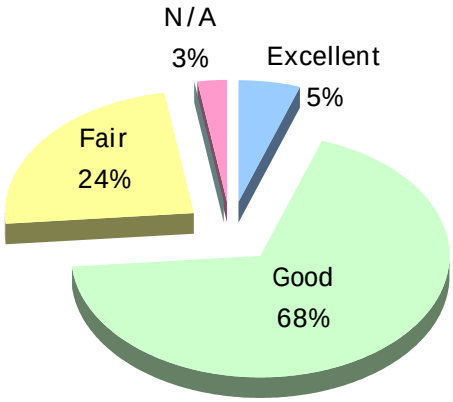
4.2. Presentation Material / Skill



Comments:

- Participants were not evenly informed about NERICA. This limited their participation.
- Participants were not well informed to adequately prepare their submission for discussion.
- Plus share the outcome with a group A and B.
- Well coordinated.
- The collect of suggestion should be done before the rentable discussion.

4.3. Contents

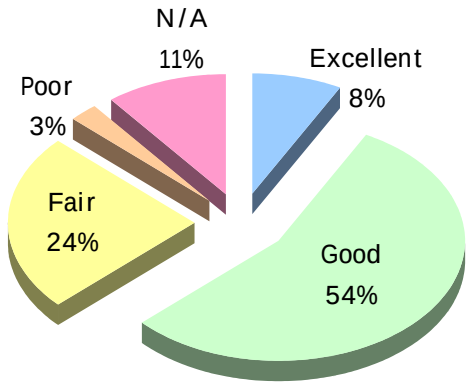


Comments:

- Target of discussion was not clear.
- Contents of presentation by the representatives of each country were changed and there was not enough explanation on it.
- The summary of the deliberation has been overdone, making impossible omission of some key points (West Africa)
- Presentations were too brief.
- The summary related to each issue is interesting.

5. Overall Management on the Seminar

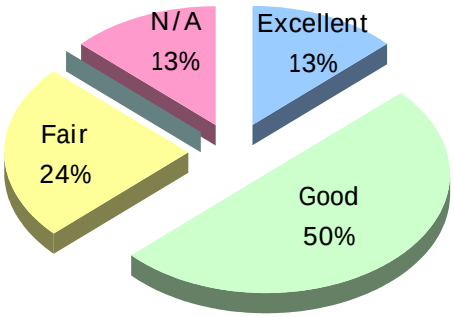
5.1. Time Allocation



Comments:

- The management was good, but it should have more time and days in the future.
- Time allocation was generally not enough for the presentations.
- More time for the questions and discussion should be allowed.
- Well managed but time was short.
- The total time for the seminar was too short and therefore the materials were bombarded with the participants.
- Calls for more seminar days of this and in the future.
- Give more time for the discussion after presentations.
- Inadequate time for discussion.

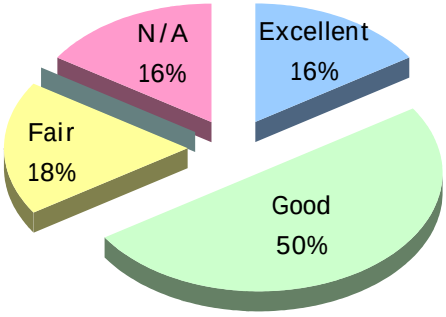
5.2. Presentation Material / Skill



Comments:

- Next time, for information of the participants, all the documents must be given on the arrival or distributed in their rooms at the hotel.
- To carry the documents, it is better to give a small bag.
- Some documents were mixed and were not distributed on time.
- Materials were very good and acceptable.

5.3. Contents



Comments:

- It has been an eye opener.
- Well arranged and most successful conference. Very time conscious team keeps it.
- Put more emphasis on lowland NERICA with an east and central Africa.
- A good overview of rice promotion and NERICA development has been continued.
- With few more additional days, most important, we should have came up with clear action plan for wax forward.
- The assistance of JICA to the rural development in undeveloped countries will be appreciated mainly with the domain of finance.
- We wish that the JICA contribute fully of the finance to develop NERICA.

6. Comparison of All the Results