

Prospects of increasing rice production and NERICA dissemination in Africa

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1. In 2004, JAICAF started the five year collaborative study in West Africa funded by the Ministry of Agriculture, Forestry and Fisheries, Japan. Various studies on NERICA cultivation were conducted, in 2004-2006 in Ghana, in collaboration with institutions Crops Research Institute, Savanna Agriculture Research Institute, and Ghana Irrigation Development Agency, and in 2006-2008 in Benin, with National Institute of Agricultural Research, and NGOs SONGHAI and CASTOR.

In this seminar, we would like to talk on principal findings on performance of upland NERICA varieties in response to cultural conditions, especially soil moistures and fertilizers applications, and also various aspects to be considered for increasing rice production in Africa.

2. In Ghana, 7 upland Nerica varieties were tested under irrigated and rainfed upland/lowland conditions. Amount of chemical fertilizers and timing of topdressing were also different among the institutions. The effect of irrigation water was obvious, and this effect became more remarkable when good amount of fertilizers was applied at the appropriate growth stage. Even when the amount of fertilizers was equal, the effect on the yield was much reduced under rainfed conditions. Also, even when the irrigation water was available, the effect on the yield was less when the amount of fertilizers was smaller. Timing of fertilizer application was another important point to increase the yield. As the upland Nerica varieties are of low tillering habit, earlier application was not effective to increase yields, but application at the panicle initiation stage was quite effective by increasing the number of spikelets per panicle and good grain filling. Based on such information, a cooperative farmer in Okyereko Irrigation Scheme could harvest around 8 t/ha in 2005. At present, Ghana utilizes this information for the seed multiplication of Nerica varieties in the dry season.

3. In Benin, the collaborative Nerica experiments of INRAB, and SONGHAI, conducted in 2007, faced various problems. In case of INRAB trials without irrigating systems, the most significant cause of yield loss was drought in the early growth stage, or in flowering/maturing stages. In case of SONGHAI, Nerica varieties planted in upland fields, where so far vegetable had been grown with sprinkling water, suffered severe damage by leaf discoloration and many missing hills. High pH of the surface soil was considered to have prevented absorption of iron (Fe), resulting in abnormal plant growth.

In 2008, yield trials were concentrated on the 4 upland Nerica varieties (N-1, N-2, N-4 and N-6), comparing their performance under the conditions of upland and lowland (though not constantly irrigated) for INRAB and CASTOR-NGO, and with or without application of chemical fertilizers for SONGHAI. Upland Nerica varieties generally performed better under lowland conditions than upland. The effect of chemical fertilizers was more notable in less fertile lowland fields. Under very fertile upland field conditions in Porto-Novo, yields were not different between the

two treatments of fertilizers, but a kind of symptom of nutritional deficiency was observed in plots without chemical fertilizer application.

4. Looking back the five-year collaborative rice program in Africa, several important points were considered almost essential to achieve doubling rice production in Africa in 10 years, as expected by Japan and international cooperating societies.

(1) Try to alleviate damages by water stresses – droughts and floods. At present, no challenges are made at all against these disasters, but it will be possible to make effective use of water, excessive in the rainy season, for food production and poverty reduction. Improving soil texture and digging small ponds in the corner of fields is recommended.

(2) Shifting cultivation practiced by many farmers is just consuming the wealth of land, not improving the fertility of land. Agriculture in the future must aim at settled cultivation due to needs for more intensified farm management. Improvement of soil property is unavoidable, and for this purpose farmers should start utilizing natural resources around their fields – weeds and grasses.

(3) Farmers complain about hard labor work in cultivating, weeding, and harvesting, but they could mitigate the labor by introducing light machinery and a variety of tools, quite simple at present. Introduction of machinery will be possible by forming a small farmers group, which enables to approach to credits easier.

(4) Nerica rice is the hope for drastic increase of production, but the seeds are beyond the reach of many farmers. Establishment of core farmers groups, organized and trained specifically for seed production, is urgently needed as well as researchers and extension agents who can manage field and seeds inspection.

(5) Many rice farmers have so far paid little attention to consumers' attitudes – preference for imported rice. The most serious problem is the poor quality of domestic rice, especially mixture of sands and mud. The problem is not simply the issue of post-harvest handling, but sometimes originating from the start of cultivation; for example, rough land leveling may induce harvesting mud with rice. Therefore, the problem is not simple, and is considered as related to the agricultural policy of the government.

(6) Many rice farmers have problems with marketing, crediting, and crop protection against birds and rodents. As for marketing, one solution would be introduction of mobile rice milling service, which is becoming popular in Uganda. Rice is becoming more staple food, and increased home consumption will alleviate the problem of marketing.

(7) Beside considerations for rice farmers, the government should pay attention for elevating the status of research and extension. At present, the situation is quite deplorable so as to hinder smooth execution of Nerica trials.

(8) Anyway, the most needed is the tough will and the determination of the government to promote rice industry and alleviate hunger and poverty of the people.

"Toward the Improvement of Livelihood of Farming Households in Africa"

Seminar held in Tokyo, on 11 March, 2009

Prospects of Increasing Rice Production and NERICA Dissemination in Africa

– Focused on the study results in Ghana and Benin–

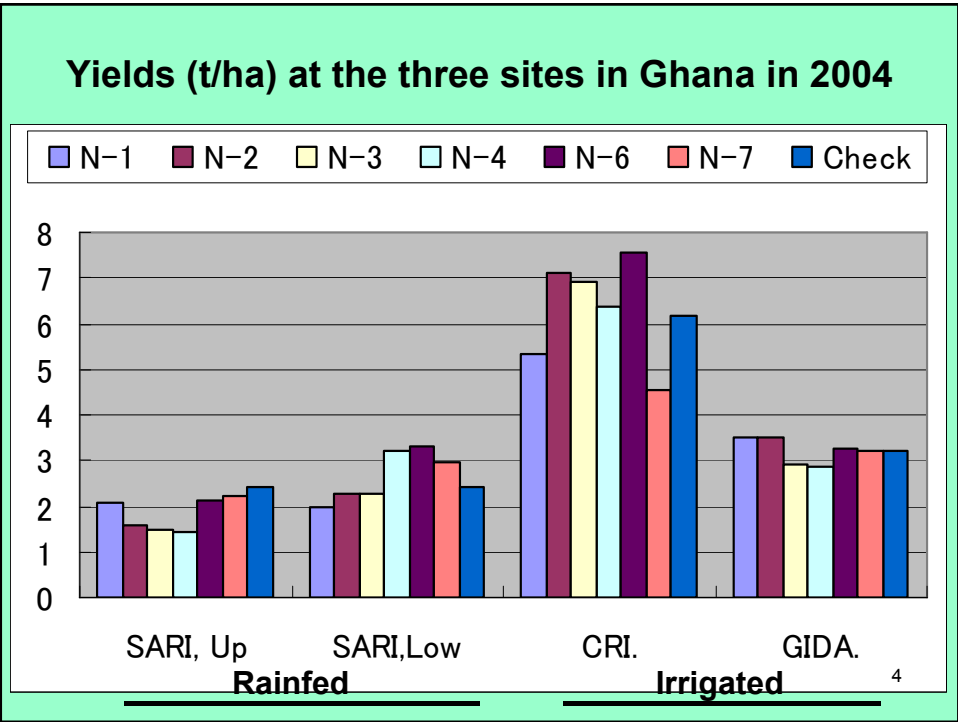
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Five Year Program in West Africa

1. **The Joint Study on the Extension of Technologies for Sustainable Food Production in Ghana, 2004 – 2006**
[With Crops Research Institute, Savanna Agriculture Research Institute and Ghana Irrigation Development Agency](#)
2. **L'Étude Conjointe sur la Diffusion des Technologies pour la Production Durable d'Aliments au Bénin, 2006 – 2008**
[With Institut National des Recherches Agricoles de Bénin, SONGHAI and CASTOR](#)

2



Difference of growing rice among 3 sites

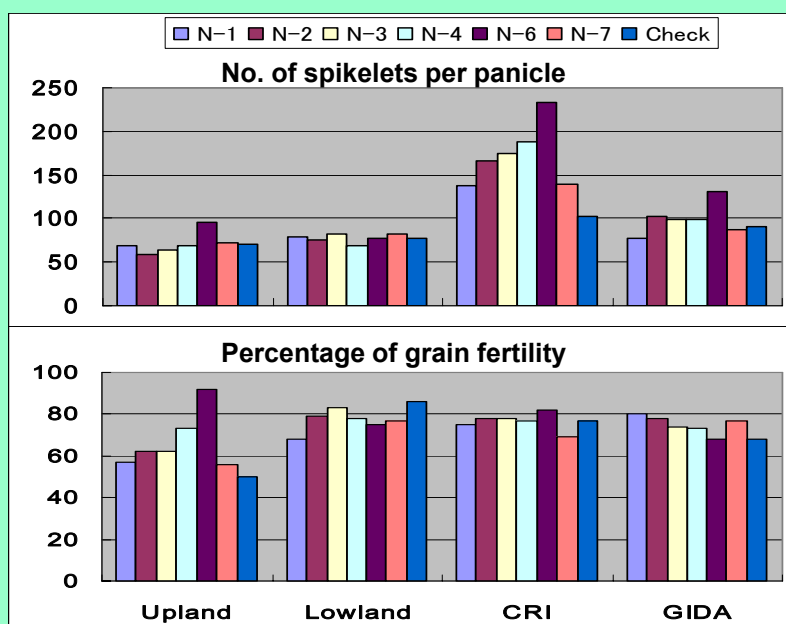
Site	SARI	CRI	GIDA
Planting	Direct seeding	Transplanting	Transplanting
Date	18/06/2004	27/07/2004	19/08/2004
Spacing	20 x 20 cm	25 x 15 cm	25 x 15
Fertilizer *	30+30 : 60 : 30	15+23+23 : 15 : 15	20+20 : 20 : 20
Topdressing	(60 DAS)**	(27, 48 DAT)**	(20 DAT)

* N:P:K (kg/ha)

** DAS: Days after seeding, DAT: Days after transplanting

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Comparison of two yield components



品 種	m2 当り 穂数	1 穂 粒数	稔実率 (%)	千粒重 (g)	収量(t/ha) (14%水分)
Nerica 1	164.2	184	85.1	30.3	7.89
	152.4	174	85.2	29.6	6.70
Nerica 2	204.8	167	82.7	25.4	7.32
	211.4	170	87.1	27.7	8.81
Nerica 3	169.8	185	84.6	29.1	7.86
	178.2	163	87.8	30.8	7.98



Mrs. Annobil, Okyereko Farm, GIDA, got 8 t/ha of paddy in 2005, in her irrigated field.

Ghana utilizes GIDA irrigated farms for producing NERICA seeds. 7

Constraints in rice cultivation in Ghana



Poor land leveling



Poor tools and hard labor work



Constraints in rice cultivation in Ghana (2)



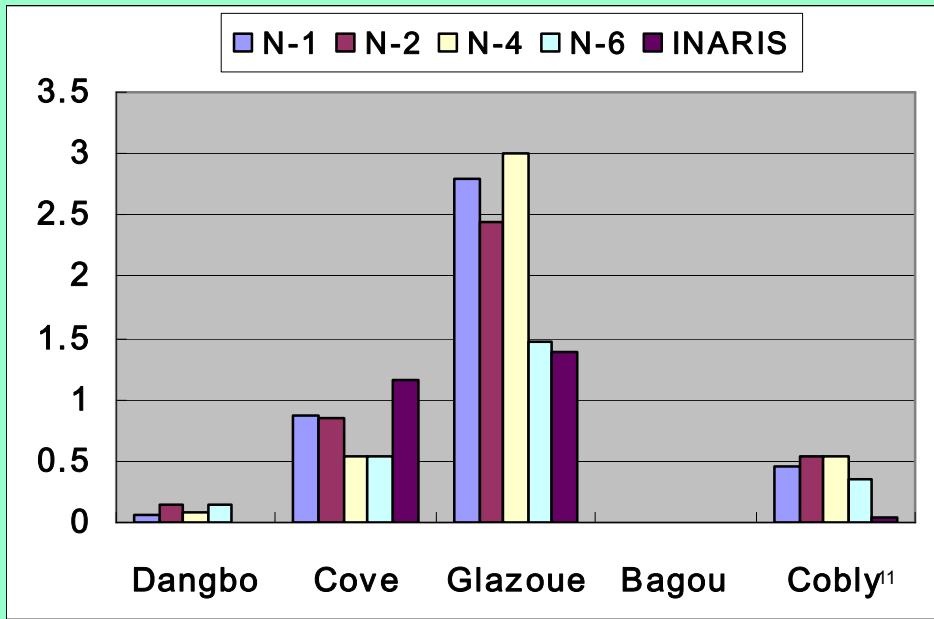
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NERICA Trials in Benin



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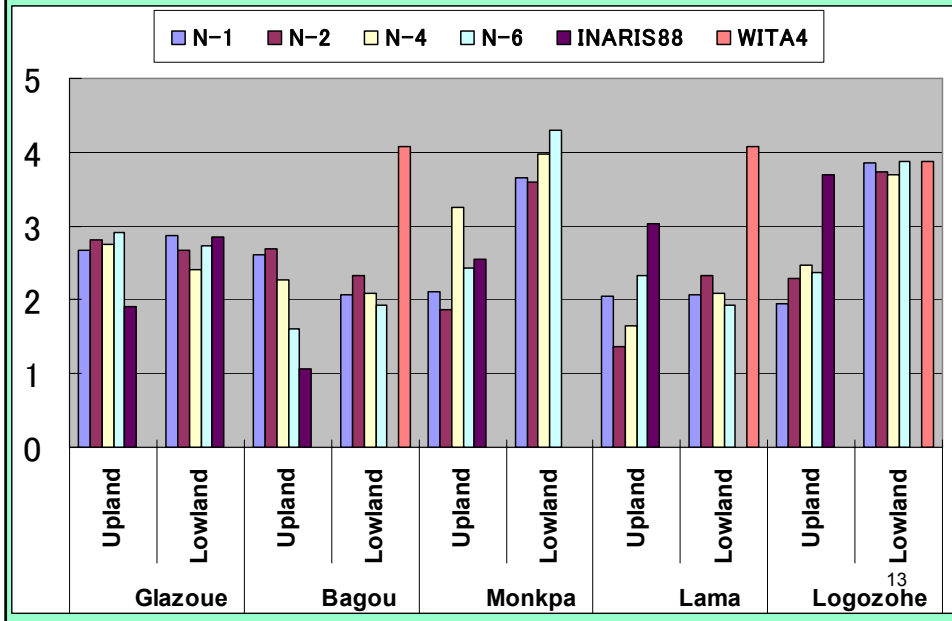
Yields (t/ha) of NERICA in 5 INRAB trial sites, 2007



Causes of very low yields in the 4 trial sites



Upland NERICA : Yields in Upland/Lowland in 2008



Terminology of “Upland” and “Lowland”



Lowland at Bagou, INRAB

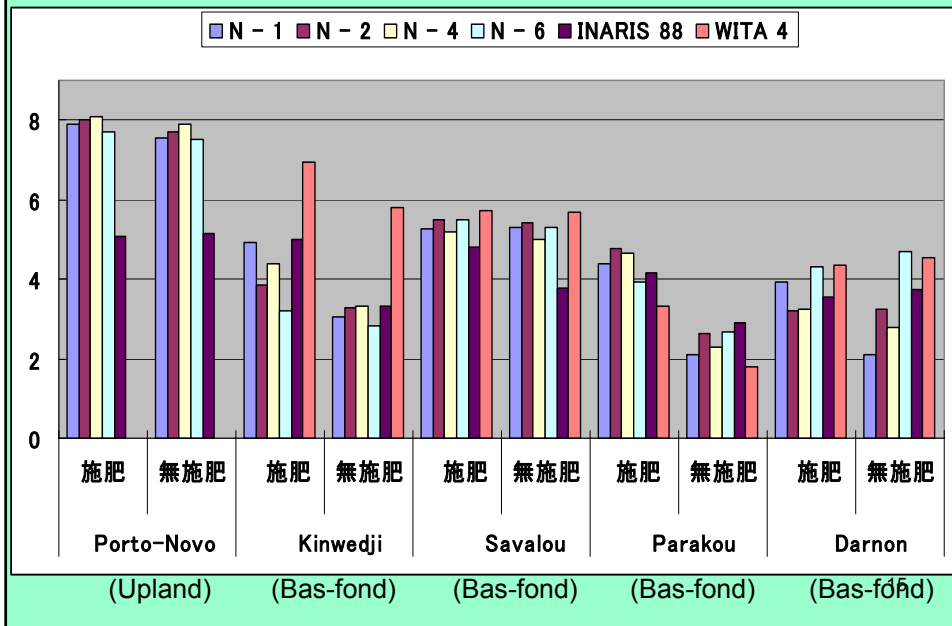


Upland in Monkpa, CASTOR



Upland in Lama, CASTOR

Upland NERICA: Response to fertilizers in 2008



Sites of good effect of fertilizers



'Betting' rice farming in an Irrigation Scheme, depending on rainfall



Water level of the Mono R. Is still too low for pumping-up

Seeded: 1 June | Seeded: 26 May

☔: 28 May ☀: 29 May ~



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Field of abandoned Nerica-4 due to **drought**, and vigorous volunteer plants of a local rice variety



Soil problems: Chlorosis and dead hills



Soil problems: in a newly opened field





1. Reduce damages by droughts and floods

Droughts and floods are not fully natural disaster, but partially manmade, to be avoided/alleviated anyhow.

- **Droughts ...** by mulching; and improving the soil by adding much organic materials; digging small ponds in the corner of the fields.....
- **Floods ...** Try to make water-ways and ponds. Water reservoirs can serve also as suppliers of protein (fish and shells)



A pond dug out by a farmer in a corner of his field (Uganda, Dec. 2005)

Water reservoir made by a group of farmers in northern Ghana for irrigation



2. Try to reduce shifting cultivation

- to become familiar with conditions of their fields,
- to change their lands more fertile, by using natural resources (grass and various weeds) around the fields, or leguminous plants.

3. Work easier with better tools and machinery

- Organize small farmer groups, and introduce small machinery. Crediting system and learning how to maintain in good conditions should be accompanied.
- Try to diversify farming tools, for use in various working conditions

4. Organize good seed production system

- Establish farmers' associations, specialized for rice seed production, with facilities of water control for irrigation, enabling double cropping.
- The government should directly support farming activities of seed production, or support private sectors concerned with seed production.
- Inspection of fields and seeds should be conducted according to the national seed law.



NERICA seed production in a farmer's upland field. Many off-type plants were observed (June 2008)

Official NERICA seed increase field in an irrigated rice project site (May 2006)



5. Make domestic rice competitive against imported rice – one of important political issues

- Rice quality is not simply the issue of post-harvest handling, e.g. mixing of mud in rice is caused by rough land leveling after ploughing



6. Make easier marketing and crediting

Mobile shelling/milling service will promote home consumption, as shown in Uganda. Then rice comes closer to daily life, and the priority of cropping works for rice will become higher.

7. Strengthen research and extension systems

8. Efforts in crop protection, especially against birds and rodents

Farmers in southern Benin complain that the result of three months' labor is lost in one day due to birds.

9. The most wanted is the tough will and the determination of the government to alleviate hunger and poverty of the people



Thank you for listening

Upland rice grown by transplanting in a maize field, Davedji, Benin