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Complementary Technology of NERICA Cultivation

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Dec. 7, 2006
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Main Objectives of ARI

To Promote and disseminate

(1) NERICA

(2) other new improved rice varieties

(3) Related technologies

in Sub-Saharan Africa

Complementary Technology

I. Experiment on the NERICA Cultivation

1. To understand Characteristics of NERICAs
2. To develop cultivation technology of NERICAs

II. Training NARS* scientists

To instruct the NARS scientists in method of the experiments through implementation of the experiment

*: National Agricultural Research System

Experiment sites in 2006

◎: Experiment ○: WARDA ⊙: JICA Office

Share of rice area and production of upland rice in Africa

Share of rice area (%)	Yield		Constraints
	Current	Potential	
44	1.0	2.0 - 4.0	Drought, low soil fertility (N, P, Iron deficiencies, acidity, erosion) Weeds, blast, stem borers, termites, striga, birds, nematodes

(Research Day of WARDA 2006)

Present Situation of Upland Rice Cultivation Method in West Africa

・Deficiency of the Strategy for Upland Rice Cultivation especially early maturing variety (NERICAs)

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Cultivation method is the Same as lowland Rice one and/or late maturing variety

Exp. Timing of the fertilizer application

1st : Basal (before sowing)
2nd : 2-3 weeks after sowing
3rd : P.I. Stage

Parts of The Yield Component in NARI, The Gambia (2005)

Variety name	No. of panicles /hill		No. of grains /panicles		% of ripened grains		1000 grains weight (g)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
NERICA 1	4.7	1.0	113.7	28.2	57.5	9.7	28.2	0.3
NERICA 2	5.4	1.9	99.6	14.3	56.5	10.3	29.2	0.3
NERICA 3	5.2	1.3	104.8	6.5	73.5	2.9	30.4	0.1
NERICA 4	5.2	1.0	86.2	10.8	72.7	0.3	29.0	1.2
NERICA 6	3.6	0.7	181.6	5.1	48.7	10.3	28.5	0.9
NERICA 7	4.9	1.3	97.5	13.2	68.3	4.5	36	0.9
WAB56-104	4.9	1.2	102.6	8.0	63.4	10.1	30.8	1.6
Mean								

(Single plant/hill)

Parts of Yield Component in CRAB, Kankan (2005)

Variety name	No. of panicles /hill		No. of grains /panicles		% of ripened grains		1000 grains weight	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
NERICA 1	4.6	1.2	51.7	18.0	48.0	11.9	28.9	0.3
NERICA 2	6.2	1.7	52.1	8.0	54.0	13.0	29.2	0.3
NERICA 3	5.6	0.6	70.7	2.7	70.3	11.9	30.4	0.8
NERICA 4	5.0	0.4	60.2	14.7	64.4	8.2	28.6	0.7
NERICA 6	4.2	0.5	70.2	14.6	58.0	7.0	31.7	0.4
NERICA 7	4.3	1.0	61.2	24.0	66.8	14.0	32.5	0.8
WAB 56-104	6.1	1.1	51.9	17.0	56.0	4.4	30.9	0.9
Mean								

(Single plant/hill)

Parts of the yield component in No-Fertilizer treatment in 2006 (WARDA)

Variety Name	No of panicles/hill		No of grains /panicles		% of ripened grains		1000 grain weight	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
NERICA1	2.0	0.1	75.2	1.3	75.2	1.3	28.4	0.5
NERICA2	2.6	1.4	91.9	12.2	79.2	5.6	26.3	0.5
NERICA4	2.7	0.4	100.3	9.6	75.2	4.3	28.6	0.5
NERICA5	2.2	0.6	76.6	0.7	75.2	4.2	26.5	0.3
NERICA6	2.4	0.4	163.5	3.2	77.5	7.1	30.0	0.5
NERICA7	2.7	0.5	114.8	40.3	76.7	9.7	34.9	0.9
WAB-104	3.4	0.1	111.0	8.1	81.9	2.7	31.8	0.5
Mean								

(Single plant/hill)

Concept of Complementary Tech.

– Analysis of the Yield Component –

25 Hs/m2 x 8 Ps/hill x 100 Gs/panicle x 70% x 28g/1000 Gs = 3,920 kg/ha

25 Hs/m2 x 8 Ps/hill x 80 Gs/panicle x 75% x 28g/1000 Gs = 3,360 kg/ha

25 Hs/m2 x 7 Ps/hill x 100 Gs/panicle x 70% x 28g/1000 Gs = 3,430 kg/ha

25 Hs/m2 x 7 Ps/hill x 80 Gs/panicle x 75% x 28g/1000 Gs = 2,940 kg/ha

Concept of Complementary Tech.

- According to the Yield Component Analysis:

(1) To Assure the No. of the Panicles/hill

- No. of the sown seeds/ pocket
- Sowing Depth

(2) To increase % of ripened grains

- Change of the Fertilizer Application Timing

Summary of Cultivation Method

- Planting method: Dibbling
- Planting Density: 20 x 20 *cm* (25 hills/m^2)
- Fertilizer Application: N:P:K = 60:30:30

1st application: 2 weeks after sowing

N:P:K = 30: 30: 30

2nd application: Meiotic Stage

N:P:K = 30: 0: 0 (Urea)

*) Sandy soil (up to 20–25cm depth)

Emergence Speed in Different Sowing Depth

Table. The mean percentage (%) of the emerged hill (150 hills/plot) on NERICA 1, 2, 3, and 4 at the different sowing depth in sandy soil, WARDA, Cotonou

Sowing Depth	5 DAS		8 DAS		11 DAS	
(cm)	Mean	SD	Mean	SD	Mean	SD
1	0.8	0.6	24.2	10.5	92.0	5.5
3	12.0	9.1	74.6	9.0	91.3	5.9
5	6.7	2.9	84.1	9.4	94.1	2.6
7	0.7	0.6	72.7	10.7	82.9	6.5

Heading Date in Different Sowing Depth

Table. Days for Heading after sowing of NERICA 1, 2, 3, and 4 in the different sowing depth

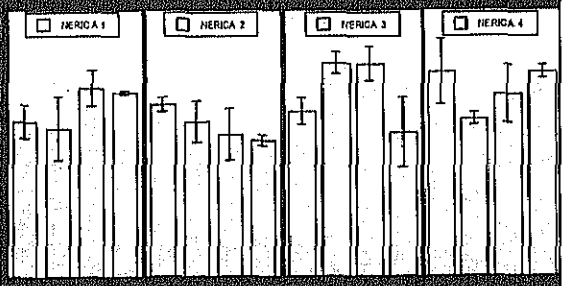
Depth	NERICA 1			NERICA 2			NERICA 3			NERICA 4		
(cm)	10	50	90	10	50	90	10	50	90	10	50	90
1	66	69	72	64	68	72	67	70	73	66	69	72
3	67	70	74	62	65	69	63	65	67	64	66	70
5	64	68	72	62	65	69	64	66	70	64	66	68
7	67	70	74	64	66	71	67	70	74	64	66	69

% of the Established Hills in Different Sowing Depth

Table. The mean of % of the established hills at harvesting in different sowing depth

Depth (cm)	NERICA1	NERICA2	NERICA3	NERICA4
1	96.9	95.1	88.4	94.4
3	84.9	95.8	94.0	92.0
5	93.3	96.9	91.6	95.3
7	89.8	79.1	72.7	85.1

Yield in different sowing depth



Heading Date in Different No. of Seeds/pocket

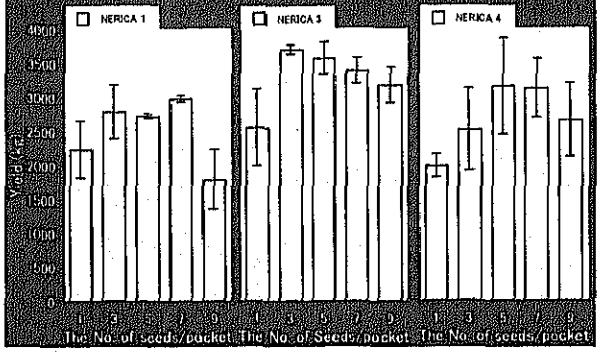
Table. Days for heading after sowing in the different number of seeds par hill

Seed	NERICA 1			NERICA 3			NERICA 4		
No	10	50	90	10	50	90	10	50	90
1	72	75	79	69	71	74	72	74	77
3	68	72	75	66	69	72	69	71	74
5	67	72	77	64	66	70	65	68	71
7	67	69	74	64	66	70	66	67	71
9	65	69	75	65	67	71	65	67	71

Table. The mean of % of the established hills at harvesting in different number of the seeds per pocket

Seed No.	NERICA 1	NERICA 3	NERICA 4
1	59.6	63.1	43.6
3	80.9	81.3	69.3
5	92.7	92.9	88.7
7	89.6	92.4	86.9
9	93.1	95.6	85.3

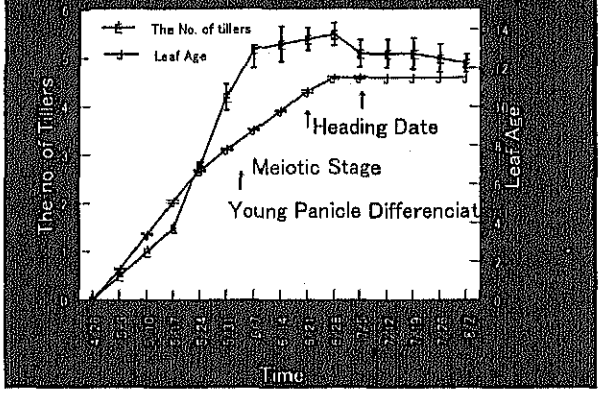
Yield in the different number of Panicles/hill



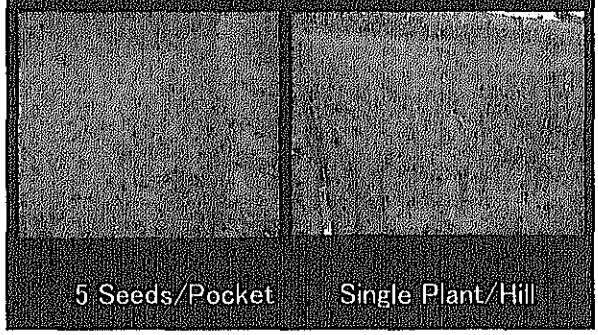
How to sow

·Sow 5 to 7 grains at 3 to 5cm depth in Sandy Soil

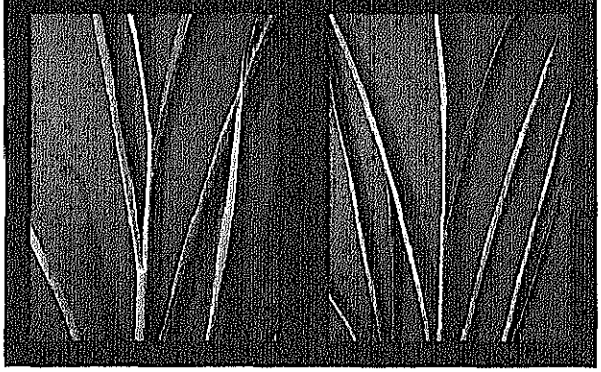
Growth of NERICA 4



Influence of Drought



Ear Manuring Timing at Meiosis



Timing of Top Dressing

Young panicle differenciation stage
(To increase No. of grains/panicle)
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Meiotic Stage
(To increase % of ripened grains)

Trainings Issues

(1) Fertilizer application

- To understand how NERICAs Develop
- Timing of Fertilizer application

(2) Collecting data and processing data

Subject in Off season of 2006 and 2007

1. Fertilizer Application Timing
   (1) Basal Application timing and method
   (2) To Understand relationship between timing of top dressing and Yield
2. Harvest Timing for NERICA