

West Africa Rice Development Association



# INGER-Africa Trial Results



**WARDA/NARS Task Force Trials Series - 1997**

## About the West Africa Rice Development Association (WARDA)

The West Africa Rice Development Association (WARDA) is an autonomous intergovernmental research association with a mission to contribute to food security and poverty eradication in poor rural and urban populations, particularly in West and Central Africa, through research, partnerships, capacity strengthening and policy support on rice-based systems, and in ways that promote sustainable agricultural development based on environmentally sound management of natural resources.

In collaboration with the national agricultural research systems (NARS) of member states, academic institutions, international donors and other organizations, the work of WARDA ultimately benefits West African farmers—mostly small-scale producers—who cultivate rice, as well as the millions of African families who eat rice as a staple food.

WARDA was formed in 1971 by 11 West African countries with the assistance of the United Nations Development Programme (UNDP), the Food and Agriculture Organization of the United Nations (FAO), and the Economic Commission for Africa (ECA). It now comprises 17 member states: Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, The Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo.

WARDA is a member of the Consultative Group on International Agricultural Research (CGIAR), a network of 16 international research centers supported by more than 50 public- and private-sector donors.

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**WARDA/NARS Task Force Trials Series - 1997**

# **INGER-Africa Trials Results**

International Network for the Genetic Evaluation of Rice (INGER) Germplasm Exchange  
West Africa Rice Development Association

2000

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# Contents

<b>About INGER-Africa .....</b>	<b>v</b>
<b>Introduction .....</b>	<b>1</b>
<b>Nurseries Distributed in 1997 .....</b>	<b>3</b>
Upland Rice .....	3
Lowland Rice .....	4
Irrigated Rice .....	5
Mangrove Swamp Rice .....	6
<b>Upland Rice .....</b>	<b>7</b>
Breeding for High Yield .....	7
Breeding for Stress Tolerance .....	10
<b>Rainfed Lowland Rice .....</b>	<b>16</b>
Breeding for High Yield: Regional Rainfed Lowland Yield Trial for Stability and Adaptability .....	16
Breeding for Stress Tolerance .....	18
Breeding for Low Input .....	23
<b>Irrigated Rice .....</b>	<b>26</b>
Breeding for High Yield .....	26
Multilocational Trials .....	38
On-farm Trial .....	42

Breeding for Stress Tolerance .....	44
Breeding for Grain Quality .....	46
Breeding for Cold Tolerance .....	50
<b>Mangrove Swamp Rice .....</b>	<b>51</b>
Breeding for High Yield .....	51
Multilocational Trials .....	62
Seed Multiplication .....	63
Seed Distribution from 1994 to 1997 .....	64
Seed Multiplication and Purification of Standard and Promising Mangrove Swamp Rice Lines, 1997 Wet Season .....	65
Breeding for Stress Tolerance .....	66
Mangrove Swamp Rice Segregating Populations .....	67

## About INGER-Africa

The International Network for Genetic Evaluation of Rice for Africa (INGER-Africa) was created in 1985, and located at IITA, Ibadan. Its goal was to provide scientists with wide range of genetic materials and to develop a network in which rice breeding lines could be tested across different conditions. In 1991, WARDA and its NARS partners established varietal improvement Task Forces comprising Upland, Lowland, Irrigated and Mangrove Swamp rice breeding activities.

The CGIAR TAC review of WARDA in 1993 recommended that INGER-Africa be relocated to WARDA, to bring together the effective NARS linkages and targeting established by the WARDA task forces and the broader coverage of the INGER network. Between 1994 and 1996, the UK Overseas Development Administration funded a project with the main purpose of transferring INGER activities to WARDA, establishing rice nurseries and seed-handling facilities, improving INGER–NARS linkages, and developing a long-term operational and financial plan.

The transfer of INGER-Africa operations to WARDA was effective in April 1997.

## INTRODUCTION

New approaches have been developed to adapt INGER nurseries to the Task Force mechanism. Nurseries are now composed according to the following principles.

**Access to germplasm:** To provide NARS with improved germplasm from a wide range of sources in order to broaden the genetic base of their breeding materials and to identify material for direct introduction. In this category we have Observational Nurseries (ON), Observational Yield Trials (OYT), and Replicated Trials for Grain Yield (RYT). These nurseries are composed for each NARS taking into account the specific combinations of traits requested by them.

**Stress related nurseries (screening at hot-spot locations):** To provide NARS scientists with a mechanism to screen their genetic materials for resistance/tolerance to specific stresses at reliable hot-spot locations in the region. Each nursery consists of nominations from NARS and WARDA.

**Regional yield stability and adaptability testing:** To provide NARS scientists with the means to test the agronomic stability and adaptability of their elite lines in multilocal regional trials. These trials are composed of promising lines nominated by NARS. The same number of common lines is evaluated in regional replicated trials for grain yield/plant type, or resistance to stresses, or both. Such trials provide information on the genotype × environment interactions and wide adaptability of the promising lines.

**Handling segregating populations:** Segregating populations from F<sub>3</sub> to advanced generation received from breeders are grown and harvested in bulk for distribution to NARS on request for *in-situ* selection and advancement nationally.

The type of nursery distributed every year to Task Force members varies. The following are the most common nurseries for Upland, Rainfed Lowland, Irrigated Lowland, and Mangrove Swamp ecosystems.

## **NURSERIES DISTRIBUTED IN 1997**

### **Upland Rice**

#### **Upland Rice Observational Nurseries**

Upland Rice Observational Nursery—Early duration

Upland Rice Observational Yield trial—Early duration

#### **Upland Rice Replicated Yield Trial**

Upland Rice Replicated Yield Trial—Early duration

Upland Rice Replicated Yield Trial—Medium duration

Upland Rice Replicated Yield Trial for Weed Competitiveness—Early duration

Upland Rice Replicated Yield Trial for Weed Competitiveness—Medium duration

#### **Upland Rice Stress Screening Nurseries**

Upland Rice Drought Tolerance Screening Nursery—Early duration

Upland Rice Drought Tolerance Screening Nursery—Medium duration

Upland Rice Acidity Tolerance Screening Nursery—Early duration

Upland Rice Acidity Tolerance Screening Nursery—Medium duration

Upland Rice Blast Resistance Screening Nursery—Early duration

## **Upland Rice Regional Trials**

Upland Rice Regional Stability and Adaptability Yield Trial

## **Upland Rice Segregating Populations**

Upland Rice Segregating Populations for Acidity Tolerance

Upland Rice Segregating Populations for Blast Tolerance

Upland Rice Segregating Populations for Drought Tolerance

Upland Rice Segregating Populations for Weed Tolerance

## **Lowland Rice**

### **Rainfed Lowland Rice Observational Nurseries**

Favorable Rainfed Lowland Observational Nursery—Early duration

Favorable Rainfed Lowland Observational Nursery—Medium duration

Rainfed Lowland Observational Nursery for Leaf and Panicle Blast Resistance—Early duration

Rainfed Lowland Observational Nursery for Drought Tolerance—Early duration

Rainfed Lowland Observational Nursery for Iron Toxicity Tolerance—Early duration

Rainfed Lowland Observational Nursery for Iron Toxicity Tolerance—Medium duration

Rainfed Lowland Observational Nursery for African Rice Gall Midge Resistance—Medium duration

Rainfed Lowland Observational Nursery for Medium Deep Water—Medium duration

### **Rainfed Lowland Replicated Yield Trial**

Favorable Rainfed Lowland Replicated Yield Trial—Early duration

Rainfed Lowland Replicated Yield Trial for Iron Toxicity Tolerance—Early duration

Rainfed Lowland Replicated Yield Trial for Iron Toxicity Tolerance—Medium duration

Rainfed Lowland Replicated Yield Trial for Drought Tolerance—Early duration

Rainfed lowland Replicated Yield Trial for African Rice Gall Midge Resistance—Early duration

### **Rainfed Lowland Regional Trial**

Rainfed Lowland Regional Yield Stability Trial

### **Irrigated Rice**

#### **Irrigated Rice Observational Nurseries**

Irrigated Rice Observational Nursery

#### **Irrigated Rice Stress Screening Nurseries**

Irrigated Rice Screening for Rice Yellow Mottle Virus Resistance

#### **Irrigated Rice Regional Yield Stability Trials**

Irrigated Rice Regional Observational Nursery

Irrigated Rice Regional Replicated Yield Trial

## **Mangrove Swamp Rice**

### **Yield Nurseries**

Mangrove Rice Observational Nursery—Early duration

Mangrove Rice Observational Yield Trial—Early duration

Mangrove Rice Replicated Yield Trial—Early duration

### **Stress Screening Nurseries**

Mangrove Rice Screening for Salinity Tolerance—Early duration

Mangrove Rice Screening for Acidity Tolerance—Early duration

Mangrove Rice Screening for Acidity Tolerance—Medium duration

Mangrove Rice for Disease Resistance—Early duration

### **Regional Replicated Yield Trial**

Mangrove Rice Regional Yield Stability Trial

### **Segregating Populations**

Mangrove Rice Segregating Populations

# UPLAND RICE

## Breeding for High Yield

### Regional Yield Stability and Adaptability Trial

#### Objectives

1. To provide NARS scientists the means to test the agronomic stability and adaptability of their elite materials in multilocational regional trials.
2. To provide information on genotype  $\times$  environment interactions and wide adaptability of the promising materials.

#### *Chad*

Fertilizer:           NPK (15-15-15): 200 kg/ha (basal)  
                          Urea: 32.50 kg/ha at tillering; 32.50 kg/ha at booting stage

Design:             RCBD, 3 replications

Site:                 Déli

## Best selections

Entry	Yield (kg/ha)
WAB 99-100	1856
WAB 99-H-14-HB	1820
WAB 56-125	1815
ITA 150	1558

## *The Gambia*

Fertilizer: NPK (15-15-15): 150 kg/ha (basal)  
Urea (46% N): 50 kg/ha in two split doses, vegetative and reproductive stages

Design: RCBD, 3 replications  
plot size 5 m × 3 m, direct seeding in rows spaced 30 cm apart

## Best selections

<b>Entry</b>	<b>50% flowering (days)</b>	<b>Plant height (cm)</b>	<b>Yield (kg/ha)</b>	<b>Phen. acc.†</b>
IR 47701-6-3-1	71	95	3644	3
ITA 150	72	100	3266	3
WAB 56-125	69	96	2600	3
WAB 56-39	69	88	3333	2
WAB 56-50	70	94	3222	3
WAB 99-100	70	110	2577	3

†Phenotypic acceptability.

## Varieties selected across countries (yield, kg/ha)

<b>Entry</b>	<b>Chad</b>	<b>The Gambia</b>
ITA 150	1558	3266
WAB 99-100	1856	2577
WAB 56-125	1815	2600

## Breeding for Stress Tolerance

### 1. Breeding for Blast Tolerance: Screening for Blast—Early duration

#### Guinea Bissau

*Objective:* To select best varieties for their tolerance to blast.

Fertilizer:	NPK (12-24-12): 150 kg/ha
Design:	RCBD, 3 replications plot size: 5 m × 3 m = 15 m <sup>2</sup>
Site:	Contuboel

**Best selections, Trial 1 (26 entries)**

<b>Entry</b>	<b>50% flowering (days)</b>	<b>Plant height (cm)</b>	<b>Blast</b>	<b>Yield (kg/ha)</b>	<b>Phen. acc.†</b>
CAN 762069	78	115	4	1462	1
WAB 96-5-1	79	117	2	1293	1
WAB 181-43	83	130	3	1265	1
FKR 27	89	102	0	1216	1

†Phenotypic acceptability.

**Best selections, Trial 2 (16 entries)**

<b>Entry</b>	<b>Yield (kg/ha)</b>
WAB 30-24	2320
WAB 32-59	2278
WAB 32-55	2278
WAB 56-104	2214
WAB 33-17	2109

## 2. Breeding for Acidity Tolerance: Screening of *O. sativa* × *O. glaberrima* Progenies for their Tolerance to Acidity

### Togo

**Objective:** To screen available materials for their tolerance to acidity.

Materials: 30 *O. sativa* × *O. glaberrima* progenies, 6 lines of *O. glaberrima* and 6 of *O. sativa*  
Fertilizer: NPK (15-15-15): 200 kg/ha (basal)  
Urea: 100 kg/ha at booting stage  
Plot size: 6 rows of 6 m length; harvested area 4.5 m<sup>2</sup>

Besides acidity, these 30 lines were evaluated for their yielding ability and earliness.

**Best selections for earliness**

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<b>Entry</b>	<b>Flowering (days)</b>	<b>Acidity (1–9)</b>	<b>Plant height (cm)</b>	<b>Plot yield (g)</b>
WA B 450-B-P-129-HB	84	1	98	500
WAB 450-PI-BP-106 HB	76	1	101	800
WAB 450-11-2-BL-DR	17	8	191	1000
WAB 450-I-BP-126-HB	79	1	75	400
WAB 450-I-B-P28-HB	79	1	89	700
WAB 450-24-3-P3-I-HB	79	1	79	1900

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### Best selections for high yield

Entry	Flowering (days)	Acidity (1–9)	Plant height (cm)	Plot yield (g)
WAB 450-P-BP-129-HB	74	1	97	1500
WAB 450-1-BP-106-HB	76	1	101	800
WAB 450-11-2-BL1-DR1	78	1	91	1000
WAB 450-I-B-P-128-1-1	82	1	100	700
WAB 450-I-B-P-62-HB	80	5	81	750
WAB 56-104	80	1	110	1200
WAB 450-4-1-1-P23-1-1	86	1	100	700
WAB 450-1-B-P-164-1-1	87	1	107	750
WAB 450-I-B-P-28-HB	79	1	89	700
WAB 450-I-B-P-138-HB	82	1	83	900
WAB 450-24-3-P3-1-HB	79	1	79	1900
SC 6216-9	86	1	91	700
SC 6631-8	89	1	74	600
SC 6631-4	91	1	70	900

### Best selections for earliness and yield

<b>Entry</b>	<b>Flowering (days)</b>	<b>Acidity (1-9)</b>	<b>Plant height (cm)</b>	<b>Plot yield (g)</b>
WAB 450-1-B-129-HB	74	1	97	1500
WAB 450-1-B-P-106-HB	76	1	101	400
WAB 450-11-2-BL1-DR1	78	1	91	1000
WAB 56-104	80	1	110	1200
WAB 450-24-P3-1-HB	79	1	79	1900
WAB 450-1-B-P-28-HB	79	1	89	700

## **RAINFED LOWLAND RICE**

### **Breeding for High Yield: Regional Rainfed Lowland Yield Trial for Stability and Adaptability**

#### **Objectives**

1. Evaluation of the yield performance of promising lines obtained from the different NARS and WARDA under a wide range of rainfed lowland environments.
2. Determining the stability and adaptability of the promising entries.

#### **The Gambia**

Number of entries:	15
Design:	RCBD, 3 replications
Plot size:	5 m × 3 m = 15 m <sup>2</sup> , 15 rows of 5 m length
Spacing:	20 cm × 15 cm
Fertilizer:	NPK (15-15-15): 150 kg/ha (basal) Urea (46% N): 50 kg/ha top-dressed at first weeding, 50 kg/ha top-dressed at second weeding.
Weedings:	20 and 40 days after transplanting.

## Best selections

Entry	Flowering (days)	Plant height (cm)	Yield (kg/ha)	Phen. acc.†
Cisadane	94	111	6933	3
BR 4	99	117	6551	3
IR 54	102	106	6350	4
CK 73	101	125	6166	2
ITA 330	91	109	6150	3
TOX4008-34-1-1-1-2	91	120	6133	3

†Phenotypic acceptability.

## Mali

Number of entries: 15  
Design: RCBD, 3 replications  
Plot size: 5 m × 3 m = 15 m<sup>2</sup>  
Fertilizer: NPK (14-22-12): 200 kg/ha  
Urea: 100 kg/ha, 2 splits  
Site: Longorola

## Best selections

Entry	50% flowering (days)	Plant height (cm)	Yield (kg/ha)
FARO 44	94	94	4244
Suakoko 8	112	129	4389

## Breeding for Stress Tolerance

### 1. Breeding for Iron Toxicity Tolerant Varieties

#### Benin

**Objective:** To select varieties for tolerance to iron toxicity

**Material and methods:**

	21 entries
Design:	RCBD, 3 replications
Plot size:	3 m × 6 m
Spacing:	25 m × 0.15 m
Site:	Niaouli (soil pH<5)
Fertilizer:	NPK (60-40-30) as per local recommendation
Results:	No statistical differences among the 21 entries for yield

## Performance of entries

Entry	Yield (t/ha)	Iron toxicity score
IR 1529-680-3	7.60	2
Niaris 65-12	6.29	1
ITA 304	6.15	3
TOX 3069-66-2-1-6	5.79	4
ITA 222	5.29	4
CK 263	5.27	1
ITA 312	5.25	3
TOX 3100-44-1-2-3-2	5.17	1
TOX 3052-41-E1-2-1-2	5.10	2
TOX 3050-46-E3-3-3-3-3	5.08	1
ITA 212 (local check)	4.71	3
TOX 3093-35-2-3-3-1	4.67	1
IR 2042-178-1	4.50	1
TOX 3561-56-2-3-2	4.44	1
CK 73	4.37	1
11365	3.40	4
Bouake 189	3.25	6
Mashuri	3.04	1
IR 31785-58-1-2-3-3	2.83	9
Wabir 12979	2.33	2
Suakoko 8 (check)	2.77	1

## 2. Regional Iron Toxicity Tolerance Yield Trial

### The Gambia

#### *Objectives:*

1. Identification and selection of high-yielding cultivars of rice tolerant to iron toxicity.
2. Promotion of promising cultivars (yield wise) with acceptable consumer qualities to farmers for adoption.

Design: RCBD, 3 replications

Plot size:  $3\text{ m} \times 5\text{ m} = 15\text{ m}^2$

Fertilizer: NPK (15-15-15): 150 kg/ha (planting)

Urea: 50 kg/ha at maximum tillering stage, and then again at panicle initiation stage.

Weeding: 20, 40 and 60 days after emergence

Sites: Brefet, Bakindik

**Best selections (yield, kg/ha)**

<b>Entry</b>	<b>Brefet 1995</b>	<b>Bakindik 1996</b>	<b>Brefet 1997</b>	<b>Bakindik 1997</b>
TOX 3100-44-2-3-3	1288	1489	3433	2944
TOX 3069-66-2-1-6	1555	2378	3444	3244
TOX 3093-35-2-3-3	1711	2356	3755	3444
CK 73	555	2800	2888	2977

***Recommendation:***

The following are recommended for on-farm testing:

TOX 3100-44-2-3-3

TOX 3069-66-2-1-6

CK 73

TOX 3093-35-2-3-3

### 3. Evaluation of some elite rice lines for their yield performance in iron toxicity problem areas

#### Nigeria

**Objective:** To test the yield performance of some elite rice lines in iron-toxic soils.

Design: RCBD, 3 replications  
Plot size: 12 m<sup>2</sup>  
Fertilizer: 80-30-30 kg NPK/ha  
Weeding: twice, active tillering and booting stage  
Sites: Bende and Edozhigi

#### Best selections

Entry	50% flowering (days)		Plant height (cm)		Yield (kg/ha)		Iron score
	Bende	Edozhigi	Bende	Edozhigi	Bende	Edozhigi	
BR 50-120-2	107	120	117	100	7388	2833	3
Suakoko 8	118	121	137	133	7388	2083	1

## **Entries selected for iron-toxicity tolerance in Benin and The Gambia**

TOX 3069-66-2-1-6

TOX 3093-35-2-3-3-1

CK 73

### **Breeding for Low Input**

#### **1. Rainfed Lowland Replicated Yield Trial for Low Input**

##### **Chad**

##### ***Objectives:***

1. To screen entries with high yield in low-input conditions.
2. To select rice for weed competitiveness and tolerant to disease and insects.

Number of entries: 11

Design: Incomplete block, 3 replications

Spacing: 20 cm × 20 cm

Fertilizer: NPK (10-10-10): 30 kg/ha (basal); 20 kg N/ha top-dressing at tillering or booting stage

Site: Mala

## Best selections

Entry	50% flowering (days)	Plant height (cm)	Yield*1 (kg/ha)	Yield*2 (kg/ha)	Phen. acc.†
KAUP M 703	59	102.6	3012	3240	7
MR 1523	87	63	3215	3020	4
RP 1045-25-2-1	88	93	3650	3700	7
RP 1746-111	98	85.3	3550	3560	5
Samridhi	55	76.16	3440	3490	3
Sakti	55	80.8	3480	3450	2
Suraksha	98	82.83	3210	3100	5
TNI/KALI	115	108.16	3120	3100	7

Yield\*1: Urea at tillering.

Yield\*2: Urea at booting stage.

†Phenotypic acceptability.

## 2. Screening for weed competitiveness in low-input conditions

### Togo

**Objective:** To identify varieties for weed competitiveness and tolerance to abiotic and biotic constraints

Number of entries: 20  
Design: RCBD, 3 replications  
Plot size: 15 m<sup>2</sup>  
Spacing: 20 cm × 20 cm  
Fertilizer: Urea: 50 kg/ha (25 and 45 days after planting)  
Sites: Adéta, Bémé  
Planting date: 15 July 1997 at Bémé and 18 July 1997 at Adéta

### Best selections for weed competitiveness

Entry	50% flowering (days)			Plant height (cm)			Yield (kg/ha)		
	Adéta	Bémé	Mean	Adéta	Bémé	Mean	Adéta	Bémé	Mean
TCA 80-4	108	107	108	98	109	104	3133	2867	3000
TOX 3880	115	119	117	109	108	108	3422	2421	2922
TOX 3732	101	103	102	98	92	95	4711	2522	3617
TOX 3050	105	104	105	101	93	98	5167	2700	3933
TOX 3561	105	107	106	90	85	88	3722	2078	2900

## IRRIGATED RICE

### Breeding for High Yield

#### Irrigated Rice Observational Nursery

#### Niger

**Objective:** To renew available materials in the store and select the best for future breeding purposes

Number of entries:	74
Design:	Block, no replications
Plot size:	5 m × 0.6 m
Spacing:	20 cm × 20 cm

**Best selections for earliness (< 120 days)**

<b>Entry</b>	<b>Panicles/m<sup>2</sup></b>	<b>Duration (days)</b>	<b>Plant height (cm)</b>	<b>Yield (t/ha)</b>
Jasmine 85	208	114	97	5.71
Keicho 2	442	114	108	5.63
Todorokiwase	495	107	49	5.55
ITA 128	195	120	103	5.83
RP 1125-604	360	120	89	6.56

### Best selections for medium duration

Entry	Panicles/m <sup>2</sup>	Duration (days)	Plant height (cm)	Yield (t/ha)
44-56 (JBJ)	144	124	99	5.77
IR 13240	294	124	81	7.14
TOX 3058-28-1-1-1	272	123	94	7.32
Bouake 189	462	123	96	7.60
GK 88	288	127	84	7.01
ITA 30	400	127	94	7.33
TOX 3108	374	127	92	7.08
GR 47	320	127	104	6.65
TCS 10	221	124	105	5.52
WITA 8	296	125	48	5.33
WITA 9	196	127	48	5.39
ITA 328	192	121	92	5.40
ITA 331	225	124	122	5.01
Eguazanpa	330	123	115	6.12
Pusa Basmati	260	128	105	5.95
TOX 3058-28-1-1-1	270	125	86	6.04

## **Nigeria**

Design: 5 m × 1 m = 5 m<sup>2</sup> single block design  
Site: Badeggi  
Fertilizer: NPK (80-30-30)

### ***Best selections***

RF 85-C1-37-1-2-3, TOX 3081-36-2-3-1, TOX 3109-73-4-5-4-1, TOX 3118-47-1-1, TOX 3717-25-2-1-2 and TOX 3772-94-1-1-1

The above entries were nominated for advanced yield trial

## **Irrigated Rice Regional Observational Nursery**

### **Senegal**

***Objective:*** To evaluate annually in the same nursery the best genotypes identified by NARS and WARDA/Sahel scientists.

Fertilizer: NPK (15-15-15): 200 kg/ha  
Urea: 150 kg/ha, 20 and 45 days after germination  
Herbicide: glyphosate (Roundup) and Garil  
Insecticide: Cyperax

## Best selections

Entry	Yield (kg/ha)	50% flowering (days)	Plant height (cm)
TOX 3717-25-2-1-2	4400	102	100
TOX 3870-28-2-1-1	4400	107	100
TOX 3732-34-1-3-2	4100	104	88
IR 53964-39-1-2-3-3	3800	102	111
IR 49461-148-1-3-2	3600	124	109
B 5322-BPN-19-MS-27-KP-1	3500	102	73
TOX 3562-8-2-1-2	3400	107	99
IR 55237-B-B-B-8-1	3200	102	77
TNAU 7893	3200	102	85
IR 1529-680-3	3000	107	101
S 992-F4-2-5-1-B	2700	102	78

## **Irrigated Rice Advanced Yield Trial: Advanced Yield Trial I and II**

### **Senegal**

***Objective:*** To test the performance of selected entries from Djibélor station in Anambe conditions

Number of entries: I (13), II (25)  
Fertilizer: NPK (15-15-15): 200 kg/ha  
Urea: 150 kg/ha, 20 and 45 days after germination  
Herbicide: glyphosate (Roundup) and Garil  
Insecticide: Cyperax  
Design: RCBD, 3 replications

## Best selections from Advanced Yield Trial I

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<b>Entry</b>	<b>Yield (kg/ha)</b>	<b>50% flowering (days)</b>	<b>Plant height (cm)</b>
Sahel 201	5680	112	84
Sahel 202	5368	107	91
TOX 3440-171	4755	119	102
TOX 3081-36	4427	115	103
TOX 3870-28	4400	103	93
Sahel 108	4133	82	83
TOX 3772-94	4115	107	86
IR 1529-680-3	4088	90	79
RF 85-C	3884	118	83
BG 400-1	3742	108	132
ITA 252	3582	109	98
TOX 3109-73	3564	110	91
IR 2042-178-1	3208	108	98

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## Best selections from Advanced Yield Trial II

<b>Entry</b>	<b>Yield (kg/ha)</b>	<b>50% flowering (days)</b>	<b>Plant height (cm)</b>
BW 311-9	5017	104	101
ITA 368	4967	117	110
BR C16-127-4-1	4950	117	131
IR 46375-CPA-19-3-1	4433	114	141
EEA 404	4384	82	133
SIP 1692033	4150	99	89
IR 64	3817	99	93
TOX3049-13-1-2-3-1	3717	114	98
RP 1641-44-1-1	3583	119	109
RP 2071-38-4-1	3400	130	106
IR 43450-SKN	3383	100	140
RP 2087-14-7-12-1	3350	121	105
Petroleo Branco (Beira)	3167	117	162
IR 1529-680-3	3117	110	88
TOX 3084-136-1-3-1-2	3050	121	100
ITA 406	2933	109	91
Potsifiotsyi 56 A	2717	106	149

## Irrigated Rice Regional Yield Stability Trial

**Objective:** To provide NARS scientists the means to test the agronomic stability and adaptability of their elite lines in multilocal regional trials.

### Mali

Number of entries: 15  
Design: RCBD, 4 replications  
Plot size: 3 m × 5 m  
Spacing: 25 cm × 25 cm  
Fertilizer: NPK (120-46-60): 100 kg/ha  
Urea: 222 kg/ha, 3/8 at tillering, 5/8 at booting

### Best selections

Entry	50% flowering (days)	Sterility (%)	Yield (kg/ha)
IR 2042-178-1	108	10.4	4493
IR 32 307-107-3-2-2	98	9.7	4420
BG 90-2	104	16.3	4379

## Senegal

Number of entries: 15  
Design: RCBD, 3 replications  
Plot size: 15 m<sup>2</sup>  
Fertilizer: NPK (15-15-15): 200 kg/ha  
Urea: 150 kg/ha, 20 and 45 days after germination  
Herbicide: glyphosate (Roundup) and Garil  
Insecticide: Cyperax

### Best selections at Anambe

Entry	Yield (kg/ha)	50% flowering (days)	Plant height (cm)
TOX3093-35-2-3-3-1	4100	92	96
CICA 8	3711	94	93
WABIR 12979	3607	84	72
IR2042-178-1	3244	89	95
MRC2663-2483	2637	76	89

## Best selections at Djibélor

Entry	Yield (kg/ha)	50% flowering (days)	Plant height (cm)
IR 2042-178-1	4624	69	95
TOX 3093-35-2-3-3-1	4606	92	96
WABIR 12979	4522	84	72
MRC 2663-2483	4203	80	89
CICA 8	3933	94	93

## Togo

Design: RCBD, 3 replications  
Plot size: 5 m × 3 m  
Fertilizer: NPK (15-15-15): 200 kg/ha  
Urea: 100 kg/ha (tillering and booting)  
Insecticide: Decis  
Site: Mission-Tove

### Best selections for yield

Entry	Yield (kg/ha)	50% flowering (days)	Plant height (cm)
TOX3093-35-2-3-3-1	4473	96	96
ITA 306	4445	97	95
IR28128-45-3-3-2	4250	108	95
IR31851-96-2-3-2	4153	89	85

### Best selections for earliness

Entry	Yield (kg/ha)	50% flowering (days)	Plant height (cm)
IR28128-45-3-3-2	4250	108	95
IR32307-107-3-2-2-2	4013	88	97
MRC2663-2483	3999	88	95
IR31785-58-1-2-3-3-3	3958	89	79

**N.B.** IR 2042-178-1 was selected in both Mali and Senegal.

## Multilocational Trials

### Mali

Eight entries are being tested in multilocational trial in five zones in the Office du Niger

*Early duration:* AD 9246, IR 51 673-59-2-1, MRC 2668-2483, ECIA 36-2-2-1-4, LEIZONG 152, BR 817-1, SIPI 692106 and 19970

### Niger

*Objective:* To evaluate selected materials from previous trials and select the best ones for on-farm trials.  
To select short to medium duration materials to be grown during the main season and during the off-season.

Plot size: 6 m × 4 m, 4 replications

Spacing: 20 cm × 20 cm

Fertilizer: NPK (157-90-30)

Urea: 170.5 kg/ha 14 days after transplanting and weeding, 170.5 kg/ha 30 days after the first application

‘Super simple’: 500 kg/ha as basal (land preparation)

KCl: 50 kg/ha as basal (land preparation)

### **Agronomic characteristics for Multilocational Trial 1 at Namari Goungou (SH 97)**

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<b>Entry</b>	<b>Duration (days)</b>	<b>Plant height (cm)</b>	<b>Yield (t/ha)</b>
TOX 3058-28-1-1	151	91	4.782
TOX 3553-36-2-2-2	142	91	4.235
TOX 3416-170-2-1-1	151	92	4.442
TOX 3233-31-6-2-1-2	158	89	4.815
TOX 3388-112-1-1-1-2	152	90	3.813
IR 15205-680-3 151	139	88	3.468

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**Agronomic characteristics for Multilocational Trial 1 at Liboré (SH 97)**

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<b>Entry</b>	<b>Duration (days)</b>	<b>Plant height (cm)</b>	<b>Yield (t/ha)</b>
TOX 3058-28-1-1	174	80	3.725
TOX 3553-36-2-2-2	171	65	3.772
TOX 3416-170-2-1-1	174	70	4.637
TOX 3233-31-6-2-1-2	171	73	3.925
TOX 3388-112-1-1-1-2	169	75	3.680
IR 15-205-680-3 174	176	90	3.542

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**Agronomic characteristics for Multilocational Trial 2 at Liboré (SH 97)**

<b>Entry</b>	<b>Duration (days)</b>	<b>Plant height (cm)</b>	<b>Yield (t/ha)</b>
FKR 14	161	77	2.747
WITA 8	160	79	3.508
WITA 9	165	78	2.897
IR 1529-680-3	166	80	2.795
BG 90-2	169	90	2.657
IR 54	170	88	2.958

## **Conclusion**

The best varieties selected from the multilocal trials for high yield and tolerance to RYMV are: WITA 8 and WITA 9.

## **On-farm Trial**

### **Mali**

*On-farm trials:* TOX 714-1-2-204-1-101-3 and Tainung Sen 12

*Released and grown by farmers:* IR 32307-107-3-2-2

### **Niger**

*Objective:* Best selections from multilocal trials are being tested in farmers conditions for final selection.

## Agronomic characteristics—On-farm Trial

<b>Entry</b>	<b>Duration (days)</b>	<b>Plant height (cm)</b>	<b>Yield (t/ha)</b>
TGR 75	-	84	2.89
ITA 331	-	105	4.71
ITA 257	-	95	3.62
TOX 3145-15-2-5	-	104	5.83
Pusa Basmati	-	130	5.80
IR 1529-680-3	-	100	6.7
TOX 3553-36-2-2-2	110	101	3.05
TOX 3416-170-2-1-1	112	81	4.32
TOX 3058-28-1-1-1	110	96	4.87
BG 90-2 101	130	81	4.59

## Breeding for Stress Tolerance

### Varietal Screening for RYMV Tolerance

#### Mali

**Objective:** To screen entries from the local gene bank for their ability to tolerate RYMV

Number of varieties: 50  
Design: 5-liter pots, 2 plants/pot  
Fertilizer: NPK (120-46-0)  
1.70 g of DAP and 0.70 g urea/pot  
Date of spraying: 30 days after planting

#### Best selections

Entry	50% flowering (days)		Sterility (%)	
	Inoculum	No inoculum	Inoculum	No inoculum
TOS 490	80	74	7.12	10.39
TOS 52	80	78	25.12	10.09
B 2363-8-5-LR-4-3	91	87	49.4	70.84

## Replicated Yield Trial for RYMV Tolerance

### Mali

**Objective:** To identify very quickly a cultivar that can replace BG-90-2 widely grown in Mali.

Number of varieties: 8  
Design: RCBD, 4 replications  
Plot size: 3 m × 5 m = 15 m<sup>2</sup>  
Spacing: 25 cm × 25 cm  
Fertilizer: NPK (120-46-60): 100 kg/ha  
Urea: 222 kg/ha, 3/8 at tillering, 5/8 at booting.  
Site: Niono

### Best selections

Entry	50% flowering (days)	Sterility (%)	Yield (kg/ha)
TOX 3052-46-E2-2-2-4-3	110	15.5	5238
TOX 3440-176-1-2-1	115	14.8	3875
TOX 3058-28-1-1	110	7.7	4763

## Breeding for Grain Quality

### Togo

**Objective:** Progenies derived from crosses made with IR 841, Pusa Basmati and Tove 1 are being selected for grain characteristics in order to face consumer needs.

Total number of lines: 81

Fertilizer:               NPK (15-15-15): 200 kg/ha  
                              Urea: 100 kg/ha

## Best selections: Lines derived from IR 841

Line	50% flowering (days)	Plant height (cm)	Yield (g/plant)
IR 84	97	103	15.3
S31	98	100	47
S3	96	111	51.2
S13-2	90	103	55.1
S16-3	97	108	49.4
S45-2	90	102	37.4
S16-3-2	97	114	70.6
S36-2	97	96	58.2
S5-1	104	100	47
S45-1	98	103	64.4
S5-2	103	112	73.6
S1	107	110	44.3
S50-2	100	100	71.4
S50-1	101	96	44.3
S5-3	101	95	38.4
S40-1	103	115	37
S31-A	97	87	49
S36-1	108	89	41
S16-2	100	100	39.1
S13-1	92	99	39
S42	97	98	58.2

## Lines derived from TOVE 1

Line	50% flowering (days)	Plant height (cm)	Yield (g/plant)
TOVE 1	97	85	29.1
ST 43	97	92	46.5
ST 48-3	97	96	29.5
ST 46	97	92	41.3
ST 37	97	95	35.5
ST 15-2	97	104	38
ST 15-1	97	102	43.6
ST 4-2	97	99	17.2
ST 48-2	97	94	26.4
ST 4-1	97	93	33
ST 31	97	95	51.4
ST 32-2	97	97	15.6
ST 48-1	97	93	25.2
ST 32-1	97	98	41.1
ST 48-1-1	97	101	40.5
ST 18	97	84	38.3
ST 13	97	80	34
ST 48-2-1	93	81	25.2
ST 10	83	85	30.7
ST 5	83	88	62
ST 3	93	86	30.4
ST 11	93	84	24
ST 26	93	80	30.5
ST 48-2-2	97	86	79

## Lines derived from Pusa Basmati

Line	50% flowering (days)	Plant height (cm)	Yield (g/plant)
Pusa Basmati	103	106	58
SPB 22-3	92	104	39.1
SPB 27	92	108	64.4
SPB 22-2	92	109	36.3
SPB 43	92	110	29
SPB 25	92	105	20.1
SPB 22-1	92	102	61
SPB 35	92	103	29
SPB 48	92	100	32
SPB 5	92	108	38.1
SPB 36	105	109	76.4
SPB 32	105	93	44.3
SPB 11-2	105	75	40.6
SPB 30	98	95	24
SPB 35	98	112	40.3
SPB 11-4	107	117	47.25
SPB 29	98	122	65.5
SPB 17	106	108	42.4
SPB 2	103	110	59.2
SPB 48	103	118	50

## Breeding for Cold Tolerance

### Benin

**Objective:** To select cultivars tolerant to cold during the off-season. Such cultivars should yield as much as possible as ADNY II, widely grown in the region.

Fertilizer: NPK (18-46-0): 100 kg/ha  
Urea: 35 kg/ha  
Planting date: 23 December 1996  
Site: Mallanville 11°52'N 03°23'E

### Best selections

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	50% flowering (days)	Plant height (cm)	Yield (g/plant)
CICA 8	97	83	3.02
TOX 3081 (local check)	96	82	2.95

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## **MANGROVE SWAMP RICE**

### **Breeding for High Yield**

#### **Preliminary Yield Trials**

**Preliminary Yield Trial Short (120–140 days), Balancera, 1997 Wet Season**

*Sierra Leone*

**Objective:** To test the preliminary yield assessment and adaptation of different lines.

## Best selections

Entry	Grain yield (kg/ha)		Plant height (cm)	50% flowering (days)
	1997	1996		
WAR 115-1-2-1-3-6-B-B-2	3912	4661	113	116
WAR 115-1-2-2-1-2-B-B-1	3558	4828	103	110
IR 21848-65-3-2-2	3253	-	102	115
WAR 115-1-2-4-2-5-B-B-2	3072	4048	101	112
WAR 133-2-B-B-5-1	2830	3577	104	116
WAR 115-1-1-2-3-B-B-2	2647	4070	105	115
WAB 89-3-A2-2-B-B-1	2559	4509	96	110
WAR 102-1-2-1	2468	3296	116	122
WAR 1 (ROK 22)	2329	3990	96	115
WAR 115-1-2-5-2-5-B-B-3	2304	4500	99	109
ROHYB 1-1	2157	3466	99	118
PA LAHAI (local check)	2087	3546	101	110
CT 6227-5-6-2	2031	3175	81	108
WAR 133-8-B-B-5-1	2005	3652	103	118
WAR 81-2-3-3-1	1875	-	83	108
IR 29723-143-3-2-1	1862	3154	80	107
RD 15	1807	-	106	115
WAR 90-3-2-1-B-N-2	1711	3259	96	116
WAR 89-3-A10-3-B-B-2	1699	3387	95	118
WAR 90-5-11-B-B-B-1	1484	-	93	119
IR 18348-36-3-3	1229	2096	74	107

**Preliminary Yield Trial—Medium duration (141–160 days), Kychom, 1997 Wet Season**

***Objective:*** To test the preliminary yield assessment and adaptation of different lines.

## Best selections

Entry	Yield (kg/ha)		Plant height (cm)	50% flowering (days)
	1997	1996		
WAR 100-2-15-2-B-B-B-1	2007	3544	100	127
IR 31912-6-1-3-2	1975	3455	111	127
BG 400-1 (ROK 31)	1942	2672	107	126
WAR 120-1-5-1-1-B-B-1	1923	1751	112	129
WAR 115-1-1-8-1-B-B-B-1	1841	2824	98	122
TOX 3440-16-3-3-2-1-2	1798	2384	73	123
ROK 5 (check)	1791	2976	108	118
IR 25586-108-1-2-2-2	1764	2248	117	128
BR 153-2B-37-1-3	1710	2173	98	128
TOX 3055-10-1-1-3-3-2	1668	2490	107	124
Pa Bangura (local check)	1646	-	122	125
BW 278-2-Pn-186-28-Rp-2	1630	-	106	125
TOX 3440-132-3-3-1	1630	1637	100	127
WAR 114-111-2-3-B-B-1	1554	-	82	128
B44B-50-2-2-5-1-1	1542	1622	110	129
TOX 3441-123-2-32-1-1	1505	2504	75	128
WAR 115-1-2-1-3-3	1462	2093	97	119
TOX 3248-76-3-1-2	1417	2151	94	121
TCA 80-4	1381	2266	95	119
TOX 3211-14-1-2-1-2	1265	1742	81	124
TOX 3118-39-2-2-2-1	940	2059	100	126

**Preliminary Yield Trial—Long duration (161–180 days), Rokupr, 1997 Wet Season: best selections**

Entry	Yield (kg/ha)		Plant height (cm)	50% flowering (days)
	1997	1996		
ROK 10	3254	-	135	151
WAR 73-1-M2-1	3037	3260	120	146
ROK 23 (ADNY 301)	2879	2794	133	147
ROK 21 (ROHYB6)imp-check	2798	2738	130	139
Kuatik Kundur	2661	2612	127	145
WAR 90-3-2-1-B-B-1	2516	2101	104	148
TOX 4009-78-1-3-1-2	2424	-	131	127
IR 58 865-2020 1010 305-1	2347	1641	104	130
Gbassin (local check)	2144	2288	134	146
TOX 3007-79-3-2-3-3	2131	2191	107	133
WAR 120-1-7-8-3-B-B-2	2093	2228	138	135
TOX 3967-31-2-3-3-1-2	2041	1892	96	132
TOX 3440-47-6-2-1-1-1	2036	2033	107	132
TOX 3831-15-3-1-1-2	2030	2262	106	134
TOX 3562-65-1-2-1-2-2-2	1824	1995	111	134
TOX 3716-22-1-3-1	1709	1760	118	133
CN 540	1693	1676	129	142
ROHYB 145	1608	1773	132	145
TOX 3760-22-1-1-3-2-1	1591	1650	102	135
ROHYB 138	1527	1989	137	128
TOX 4005-18-2-1-2-2-1	1403	1551	102	135

## **Mangrove Swamp Rice Regional Stability and Adaptability Trials**

**Objective:** To provide NARS scientists the means to test the agronomic stability and adaptability of their elite varieties in multilocal regional trials.

### ***Guinea Bissau***

Number of entries:	14
Plot size:	12 m <sup>2</sup>
Net:	9.36 m <sup>2</sup>

## Agronomic characteristics of entries

Entry	Yield (kg/ha)	Plant height (cm)	50% flowering (days)	Phen. acc.†
WAR 1 (ROK 22) (check)	5667	124	99	1
WAR 77-3-2-2	4933	113	98	3
YACA (local check)	4800	134	107	1
BR 50-120-2	4767	113	99	1
BG 400-1	4733	134	99	1
RD 15	4700	126	103	1
ROHYB 4-WAR-1-3-B-2	4633	121	98	3
ROK 5 (local check)	4633	127	95	1
ADNY 11	4300	113	93	3
WAR 81-2-1-2	4267	126	103	1
WAR 115-1-2-10-5	4100	91	103	5
KAU 25331 (c. salinity)	4067	153	107	5
BW 295-5	4000	123	100	1
DJ 684-D	3600	90	85	5

†Phenotypic acceptability.

## *Nigeria*

Site: WARI in Delta state  
Design: RCBD, 3 replications  
Plot size: 3 m × 4 m  
Fertilizer: NPK (40-30-30)  
Urea: first top-dressing: 20 kg/ha, second top-dressing: 20 kg/ha

## Yield and other agronomic traits of Regional Mangrove Trial

Entry	Plant height (cm)	50% flowering (days)	Yield (kg/ha)	Phen. acc.†
ADNY 11	-	-	-	-
BG 400-1	72.7	99	1320	4
BR 50-120-2	87	96	1278	3.3
BW 295-5	85	108	1433	2.3
DJ 684-D	-	-	-	-
WAR 27-28-1-3-1	91.7	110	1775	2.7
RD 15	-	-	-	-
ROHYB 4 WAR-1-3-B-2	77	110	1750	2.3
FARO 15	101	110	1656	2.3
CK 4	121	98	2189	1.3
WAR 115-1-2-10-5	61.7	97	1194	5.3
WAR 77-3-2-2	99.3	112	2569	1.0
WAR 81-2-1-2	72.3	101	1184	5.3

†Phenotypic acceptability.

## *Senegal*

Site: Djibélor  
Fertilizer: NPK (15-15-15): 200 kg/ha  
Urea: 150 kg/ha  
Transplanting: 28 June 1997  
Plot size: 12 rows of 5 m length  
Spacing: 20 cm × 20 cm

### **Best selections**

<b>Entry</b>	<b>Yield (kg/ha)</b>	<b>50% flowering (days)</b>	<b>Plant height (cm)</b>
BR 50-120-2	4306	108	126
IR 21855-63-2-1-2-2-1	4166	101	101
WAR 100-2-12-1	4069	105	95
WAR 115-1-2-11-4	3969	110	93
BR 51-282-8	3910	106	126
WAR 115-111-2-3-B-B-1	3879	103	110
IR 2856-44-1-1	3639	109	118
BW 267-3	3398	101	112

*Sierra Leone (Balancera)*

**Agronomic performance of regional yield trial**

<b>Entry</b>	<b>Yield (kg/ha)</b>	<b>Plant height (cm)</b>	<b>50% flowering (days)</b>
WAR 77-3-2-2 (yield check)	2128	98	111
RD 15	1948	95	114
BW 295-5	1756	100	106
WAR 1 (ROK 22) (yield check)	1616	95	110
ROHYB 4-WAR-1-3-B-2	1597	87	110
WAR 77-3-2-2	1572	99	111
PA LAHAI	1560	100	116
ROK 5 (imp. check)	1430	93	111
BR 50-120-2	1350	95	116
BG 400-1 (ROK 31)	1331	95	113
KAU 25331 (salinity check)	1002	98	118
DJ 684-D	996	92	110
WAR 115-1-2-2-10-5	868	74	105
ADNY 11 (ROK 12)	842	86	104
WAR 18-2-1-2	723	96	115

## Multilocational Trials

### Guinea Bissau

**Objective:** To evaluate 4 cultivars over several locations

Sites: Cubucare, Tombali, Quinara

Entries: RD 15, ROHYB 6, WAR 77-3-2-2, ROK 5

### *Best selections*

Cubucare: WAR 77-3-2-2, ROHYB 6, RD15

Tombali: ROK 5, ROHYB 6, RD15

Quinara: ROK 5, WAR 77-3-2-2, RD 15

## Seed Multiplication

### Guinea Bissau

Entry	Area (m <sup>2</sup> )	Production (kg)
MST	25792	3600
RD 15	4116	980
WAR77-3-2-2	1861.5	779
BG380-2	240	364
CABLAK	170	138
YACA	250	95.5
ROK5	250	70
CK4	170	69
ATANHA	170	69
WAR100-1-3-1	170	65
BG400-1	200	63
ROHYB4	170	42.3
ROHYB6	170	29.8
BG367-4	170	24.5
DJ684D	170	28.5

## Seed Distribution from 1994 to 1997

### Guinea

From 1994 to 1998, the following cultivars have been multiplied and distributed (kg).

Year	ROK 5	B38D2	WAR I	Tamba	Balanta	Basa	Suakoko	8	CQ15	Samba	Kaolack	YACCA	BW	RD 15
				<u>Yegueti</u>						<u>Konkon</u>			<u>295-5</u>	
94/95	9.593	7.241	2.241	3.3	14.1	13.2	8.35	-	-	-	-	-	-	-
95/96	31.945	5.994	8.723	-	25.968	10.11	5.034	-	-	-	-	-	-	-
96/97	234.196	21.153	38.45	-	30.85	7.455	14.25	7.8	-	-	-	-	-	-
97/98	124.817	41.983	-	-	45.5	3.4	22.584	20	17.362	1.738	2.369	2.58	3.556	

## Seed Multiplication and Purification of Standard and Promising Mangrove Swamp Rice Lines, 1997 Wet Season

### Sierra Leone

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Line	Quantity (kg)
ROK 5	500
ROK 21 (ROHYB 6-WAR-6-2-B-2)	250
ROK 22 (WAR 1)	500
ROK 10	100
WAR 77-3-2-2	250
PA LAHAI (KAULAKA)	28

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## Breeding for Stress Tolerance

### Replicated Yield Trial for Tolerance to Acidity

#### Guinea Bissau

**Objective:** To evaluate introduced lines for their tolerance to acidity.

Number of entries: 5  
Design: RCBD  
Plot size: 15 m<sup>2</sup>

#### Best selections

Entry	Yield (kg/ha)	Plant height (cm)	50% flowering (days)	Phen. acc.†
YACA	4000	138	117	1
ROK 5	3867	95	100	3
BR50-120-2	3100	85	111	1
BR 51-282-8	2967	126	103	1
IR 2856-44-1-1	2967	98	102	1

†Phenotypic acceptability.

## Mangrove Swamp Rice Segregating Populations

### Senegal

**Objective:** Several new crosses were made in Rokupr, Sierra Leone in 1995. Seeds were multiplied in 1996. Seeds were harvested in bulk and sent for *in-situ* selection.

Number of lines: 264  
Site: Djibélor  
Fertilizer: NPK (15-15-15): 200 kg/ha  
Urea: 150 kg/ha, 2 splits  
Transplanting: 28 June 1997  
Plot size: 6–8 rows of 5 m long  
Number of families selected: 37

## About the Consultative Group on International Agricultural Research (CGIAR)

The Consultative Group on International Agricultural Research (CGIAR) was founded in 1971 as a global endeavor of cooperation and goodwill. The CGIAR's mission is to contribute, through its research, to promoting sustainable agriculture for food security in developing countries. The CGIAR works to help ensure food security for the twenty-first century through its network of 16 international and autonomous research centers, including WARDA. Together, the centers conduct research on crops, livestock, fisheries, and forests, develop policy initiatives, strengthen national agricultural organizations, and promote sustainable resource management practices that help provide people worldwide with better livelihoods.

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CIAT	Centro Internacional de Agricultura Tropical (Cali, Colombia)
CIFOR	Center for International Forestry Research (Bogor, Indonesia)
CIMMYT	Centro Internacional de Mejoramiento de Maiz y Trigo (Mexico, DF, Mexico)
CIP	Centro Internacional de la Papa (Lima, Peru)
ICARDA	International Center for Agricultural Research in the Dry Areas (Aleppo, Syria)
ICLARM	International Center for Living Aquatic Resources Management (Manila, Philippines)
ICRAF	International Centre for Research in Agroforestry (Nairobi, Kenya)
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics (Hyderabad, India)
IFPRI	International Food Policy Research Institute (Washington, DC, USA)
IITA	International Institute of Tropical Agriculture (Ibadan, Nigeria)
ILRI	International Livestock Research Institute (Nairobi, Kenya and Addis-Ababa, Ethiopia)
IPGRI	International Plant Genetic Resources Institute (Rome, Italy)
IRRI	International Rice Research Institute (Los Baños, Philippines)
ISNAR	International Service for National Agricultural Research (The Hague, Netherlands)
IWMI	International Water Management Institute (Colombo, Sri Lanka)
WARDA	West Africa Rice Development Association (Bouaké, Côte d'Ivoire)



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