

Partnership- and capacity building- based approaches to tackle major biotic constraints to rice production

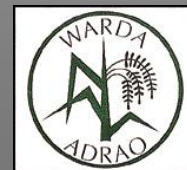
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Blast disease – cereal killer

11% - 30% crop losses

Annual loss of 157 M tonnes

Pathogen eradication - the increase in rice yields would feed an additional 60 M people each year

Resistant cultivars - field life of only 2 - 3 years due to newly virulent forms of blast

How to defeat this dreaded pathogen?

Recent global strategies have been based on a sound understanding of the pathogen biology (genetic and virulence diversity)

A combination of novel molecular tools and pathological assays have been developed globally

Blast causes up to 77% yield losses in WA

Problem in all rice growing ecologies

8 Lineages
8 -10 Pathotypes

5 Lineages

India > 30 Lineages
Philippines 10 Lineages
Korea 16 Lineages
Thailand 68 Lineages
175 Pathotypes

Colombia
17 Lineages
39 - 45 Pathotypes

Knowledge gap

1996 - 97

UK's Department for International Development- Crop Protection Programme



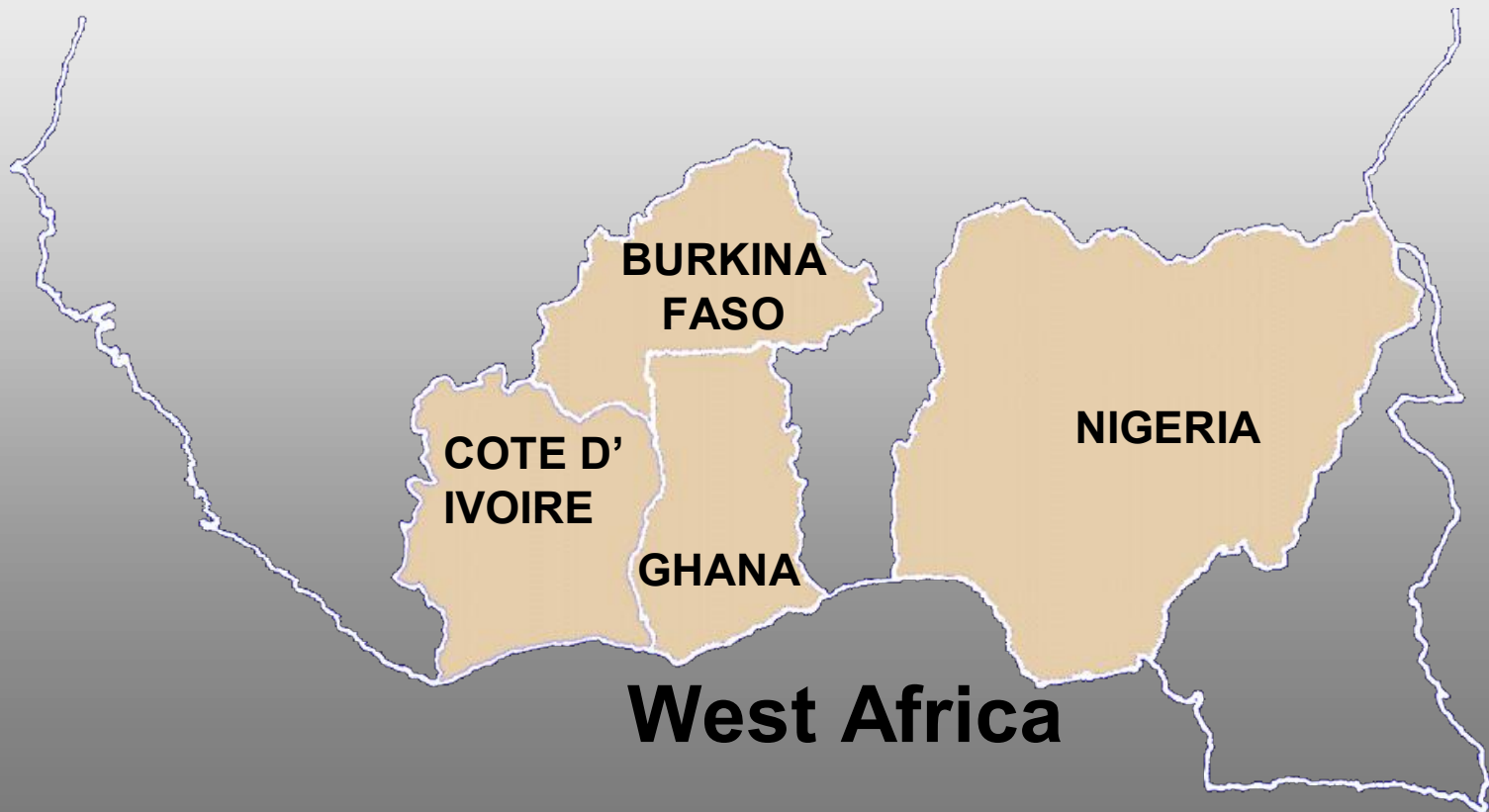
**Funded a research programme to address
the blast pathogen management**

Projects R6738 & R7552

ARC-WARDA, NARS and Warwick HRI partnership

**African expertise in rice pathology and breeding
and international expertise in
molecular technologies**

Target Countries



**8 Lineages
8 -10 Pathotypes**

5 Lineages

**India > 30 Lineages
Philippines 10 Lineages
Korea 16 Lineages
Thailand 68 Lineages
175 Pathotypes**

**Colombia
17 Lineages
39 - 45 Pathotypes**

**16 Lineages (9 WA)
56 Pathotypes
More than 50
Varieties**

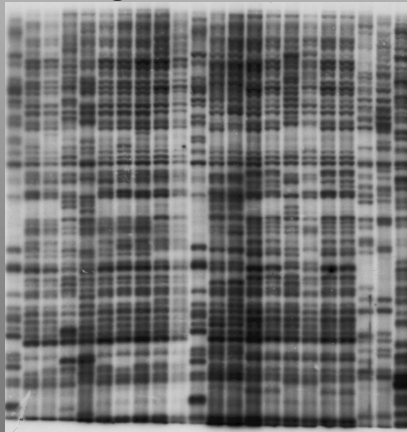
**2002 - Knowledge gap filled for 4 West
African countries**

Pathogen diversity & distribution mapped across key sites in 4 countries

Dominant genetic lineages & pathotypes identified

Key screening/PVS sites characterised

DNA fingerprints of
M. grisea isolates



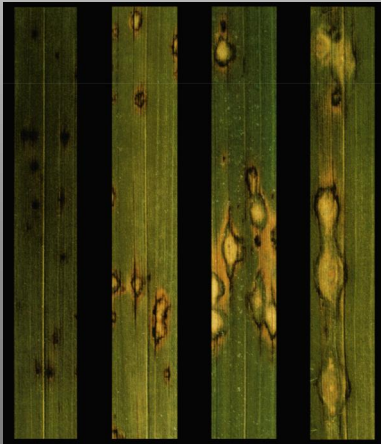
**Potential resistances &
Reaction of some of the
NERICAs identified**

**Blast pathogen movement across the region
potentially via seed exchanges**

Blast pathogen present on weedy rices

**Pathogen derived from these weeds causes blast
on rice**

Virulence of *M. grisea*
isolates



**Clean seed and adequate
quarantine measures**

**Integrated approach
important for blast and
weed management**

Other issues

Introduction of rice varieties into new locations without the knowledge of the pathogen could lead to pathogen build up and resistance break down

Varieties with new characteristics could also lead to increase in other pests and diseases e.g. Sheath blight situation in Asia after the introduction of the MVs

Key Elements

Close interaction and collaboration of the project partners with

ROCARIZ Network: IPM-, Breeding- and Technology Transfer-TFs

- Disease surveys & Collection of blast samples**
- Screening rice varieties by linking to the PVS programmes**

Capability Strengthening

WARDA Pathology Staff - Training attachments at Warwick HRI, UK

WARDA & NARS Senior Pathologists - Shuttle visits to Warwick HRI

African Pathologist – PhD at Warwick HRI

Knowledge transfer to WARDA & NARS partners

Knowledge Dissemination

National Meetings & Journals; Regional Meetings in Africa & EU; International Meetings & W W W

Rice Blast Stakeholder Workshop, Accra, Ghana, 2003

- **Workshop Proceedings published as a resource for wider dissemination**
- **Strong stakeholder interest in promotion of blast molecular diagnostic technology to WARDA and NARS**

Regional Capacity Building Opportunities & Challenges

SSA scientists familiarised to molecular tools for blast pathogen monitoring along with rice intensification

WARDA and NARS centres as regional and national hubs

Feed into regional and national programmes for blast resistance breeding and deployment



Conclusions / Policy implications

- **Clean seed technologies and adequate quarantine measures**
- **Resistance deployment based on pathogen knowledge**
- **Integrated management (e.g. blast and weeds)**
- **Capability building for pathogen monitoring**
- **Partnership based approach**
- **Research infrastructure and support**



**DFID-CPP, Dr. Frances Kimmins,
Dr. Andrew Ward & Dr. Tim Chancellor
Colleagues from ARC-WARDA, NARS,
Warwick HRI and Other organisations**

Workshop organisers

