

Beneficial impact

Cisadane can withstand very high levels of gall midge populations by producing extra tillers to compensate for the damaged ones, thus ensuring a good harvest for farmers in gall-midge endemic areas.

Disadvantage of Cisadane

Cisadane is not tolerant to iron toxicity, another common problem in lowland rice in West and Central Africa.

Adoption

- Has the new variety been adopted by farmers in southeast Nigeria?

Yes.

Farmers have replaced their old varieties (e.g., IR 5, Ex-China, FARO 12, FARO 15) with Cisadane. It has been recommended by the National Crop Variety Release Committee for gall-midge endemic areas in Nigeria.

Future prospects

- Other potentially gall-midge resistant or tolerant genotypes are being studied in Nigeria, Burkina Faso, Sierra Leone and Mali. For instance, BW 348-1 is tolerant to both AfRGM and iron toxicity, and is scheduled for release in Nigeria and Burkina Faso.
- There is a need to screen more lowland-adapted *O. sativa* (subspecies *indica*) because we are yet to identify a strongly resistant one.
- Recent advances in biotechnology increase the prospects of generating gall-midge resistant rices from lowland-adapted *sativas* and resistant *glaberrimas*.

Cisadane

About WARDA – The Africa Rice Center

WARDA – The Africa Rice Center is one of 16 International Agricultural Research Centers supported by the Consultative Group on International Agricultural Research (CGIAR). WARDA is also an autonomous intergovernmental research association of African member states.

WARDA's mission is to contribute to poverty alleviation and food security in Africa, through research, development and partnership activities aimed at increasing the productivity and profitability of the rice sector in ways that ensure the sustainability of the farming environment.

The *modus operandi* of WARDA is partnership at all levels. WARDA's research and development activities are conducted in collaboration with various stakeholders – primarily the National Agricultural Research Systems (NARS), academic institutions, advanced research institutions, farmers' organizations, non-governmental organizations, and donors – for the benefit of African farmers, mostly small-scale producers, as well as the millions of African families for whom rice means food.

The 'New Rice for Africa' (NERICA), which is bringing hope to millions of poor people in Africa, was developed by WARDA and its partners. The success of the NERICAs has helped shape the Center's future direction, extending its horizon beyond West and Central Africa into Eastern and Southern Africa. The creation of NERICA is in harmony with the spirit of the World Summit on Sustainable Development (WSSD), the Tokyo International Conference on Africa's Development (TICAD), the Millennium Development Goals (MDG), and the New Partnership for Africa's Development (NEPAD) for sustainable development. The African Rice Initiative (ARI) was launched in 2002 to promote the dissemination of NERICA and complementary technologies throughout SSA.

WARDA hosts ARI, the Regional Rice Research and Development Network for West and Central Africa (ROCARIZ), and the Inland Valley Consortium (IVC).

WARDA has its headquarters in Côte d'Ivoire and regional research stations near St Louis, Senegal, at the International Institute for Tropical Agriculture (IITA) in Ibadan, Nigeria, and at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) research station at Samanko, near Bamako, Mali.

For more information, visit www.warda.org

About the National Cereals Research Institute (NCRI)

The National Cereals Research Institute (NCRI) is a research institute under the Federal Ministry of Agriculture and Natural Resources, Nigeria. It was established in 1899 by the British Colonial Administration, was renamed the Federal Department of Agricultural Research in 1963, and has been known as NCRI since 1975.

NCRI conducts research into the production, processing and industrial capacity utilization of rice, hungry rice (*Digitaria*), oilseeds (soybean and beniseed) and sugarcane. It fabricates simple agricultural tools, such as planters, shellers, and fertilizer-spreaders. It disseminates the results of its research to public and private sectors.

NCRI provides consultancy services in soil and plant analysis; feasibility studies on agricultural and agro-industrial businesses for banks, individuals, farms and consultants; soil survey, mapping and evaluation; testing and evaluating agro-chemicals (fertilizers, pesticides) on rice, soybean, beniseed and sugarcane for various agro-climatic conditions; management of agricultural projects; development and execution of medium – and large-scale agro-allied enterprises. NCRI makes and distributes farming implements and machinery, and distributes cultivars of rice and soybean.

NCRI Headquarters are at Badeggi village, kilometer 11 on the Bida-Suleja Highway, Niger State. It is about 85 km from the State capital, Minna, 850 km from Lagos, 324 km from Kaduna, 150 km from Abuja, and 380 km from Ilorin. NCRI operates from substations at Ibadan (Oyo State), Amakama (Abia State), Bacita and Mokwa (Niger State), Yandev (Benue State), Uyo (Akwa-Ibom State), Numan (Adamawa State), Birnin-Kebbi (Kebbi State) and Warri (Delta State).



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CISADANE



Gall-midge tolerant variety released in Nigeria as FARO 51 in 1998

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Background

- The African rice gall midge (*AfRGM*), *Orseolia oryzivora* Harris & Gagné (Diptera: Cecidomyiidae), is an indigenous pest that has caused serious damage to lowland rice crops in Sub-Saharan Africa over the last two decades.
- Improving varietal resistance or tolerance is one of the most promising options for managing the pest.
- Cisadane, first introduced through the International Rice Testing Programme (now called the International Network for Genetic Evaluation of Rice in Africa, INGER-Africa) in 1982, was evaluated at Edozhigi, central Nigeria, in 1982. It was one of the least-infested varieties.
- After outbreaks of *AfRGM* occurred in over 50,000 hectares of lowland rice in southeast Nigeria in 1988, the variety was further evaluated in farmers' fields at Abakaliki, Ebonyi State, southeast Nigeria.
- In on-farm trials in 1995 with 38 farmers in Ebonyi State, the variety was found tolerant and provided a useful component of *AfRGM* management. It gave 26% higher yield than farmers' varieties.

Sources of resistance or tolerance to *AfRGM*

Rice species	Total accessions screened [†]	Selected for resistance or tolerance [†]	Origin	Released varieties [‡]
<i>Oryza sativa</i>	>1500	Cisadane	Indonesia	FARO 51 in Nigeria
		BW 348-1	Sri Lanka	
		TOS 14519	The Gambia	
		TOG 7106	Mali	
<i>Oryza glaberrima</i>	122	TOG 7206	Côte d'Ivoire	
		TOG 7442	Nigeria	
		TOG 6346	Liberia	
		NERICAs [§]	102	WAB 450-I-B-P-181-2-1-HB

[†] At WARDA

[‡] Africa-wide

[§] NERICAs are stable lines derived from crosses between *O. sativa* and *O. glaberrima*.

Performance of susceptible variety ITA 306 under field conditions.



Performance of Cisadane under field conditions.



Panicles of Cisadane still attached to parent plant.



Grain yield of Cisadane and farmers' check varieties at different gall-midge infestation levels, 7 weeks after transplanting with 38 farmers in Ebonyi State, southeast Nigeria, rainy season 1995.

Gall midge infestation level (%)	No. of farmers	Mean grain yield (kg/ha)		Yield difference (%)
		Cisadane	Farmers' varieties [†]	
0-10	7	2,810	2,798	0.4
10-20	7	2,407	1,865	29
20-30	4	1,211	736	65
30-40	6	1,166	687	70
40-50	8	1,280	1,023	25
>50	6	785	413	90
Total/average	38	1,666	1,326	26

[†] Farmers' varieties: ITA 306 (29%), IR 5 (16%), Ex-China (8%), FARO 12 (5%), FARO 15 (5%).



Harvested panicles of Cisadane



Agronomic traits of Cisadane

Ecology	Rainfed and irrigated lowlands
Plant height	117 cm
Duration	145 days
Yield potential	6 t/ha
Iron-toxicity score (1-9)	5
Grain thickness	1.91 mm
Grain width	2.58 mm
Grain length (brown rice)	6.87 mm
1000-grain weight (at 14% moisture)	30 g
Grain type	Long bold
Cooking time	23 min