

Enhancement of On-farm Rice Productivity

An overview of Sustainable Productivity Enhancement R&D at AfricaRice

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AfricaRice

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SPE program focus:

- Situation and scenario analysis
- Development of innovations
- Assistance to development partners for scaling innovations
- Capacity sharing

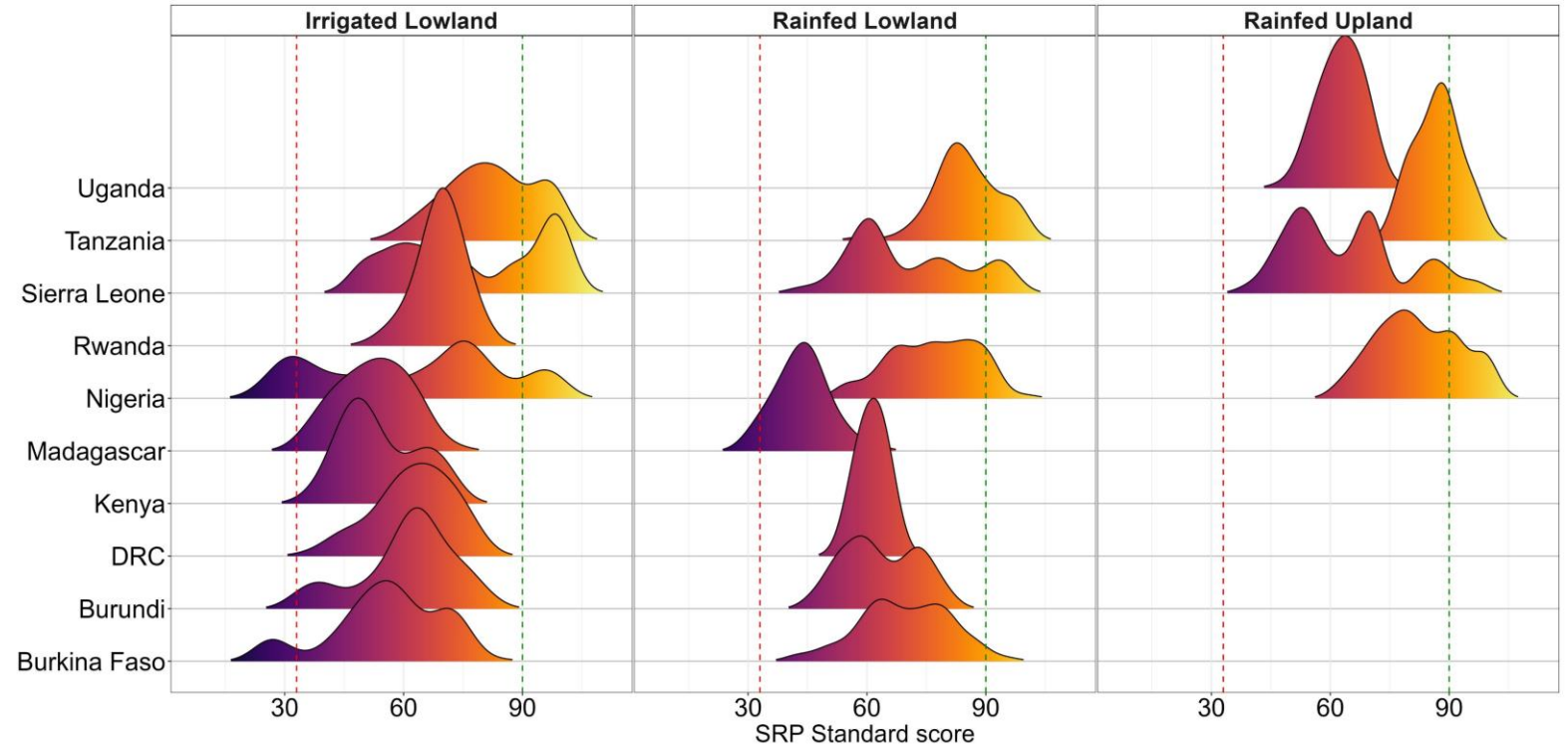
(NARES training; PhD/MSc students)

SRP standards & indicators analysis

> 3000 farmers surveyed
in 10 countries

87% farmers working
towards sustainability;
only few farmers (9%)
cultivating rice
sustainably (Tanzania,
Sierra Leone, Nigeria,
Burkina Faso)

Nutrient Management,
Record keeping, Following
cropping calendar,
Training – most influencing
Sustainability



Agronomic R&D innovations 2025

Sowing date optimization

Sowing within sowing window – **Higher yields (up to 7.5 to 8.5 t/ha)** in Senegal.
Supported by increased NUE up to 62 kg kg^{-1} and PUE up to 423 kg kg^{-1})

Yield stability analysis

Across crops **Mineral fertilizers** increases yield stability.
Achieving **high yield and yield stability** is not conflicting goal

Crop diversification

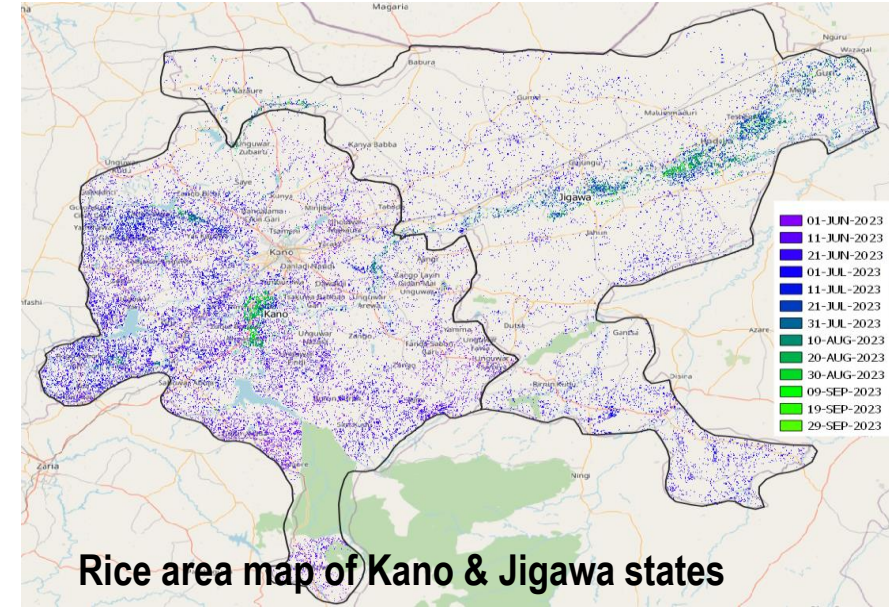
100 to 250% more profit than cultivating rice alone;
Increase diversified food intake



Agronomic R&D innovations 2025

Rice area; yield & yield gap maps

Remote sensing and crop modelling using RiceYES interface - can map rice area and yield with an accuracy of 85 to 90%



Salinity management

Yield gains ranged from 1.0 to 2.0 t/ha (23 - 56%) with integrated options; Salt-tolerant varieties improved rice yield by up to 1.4 t/ha with profitability gain by 312 €/ha



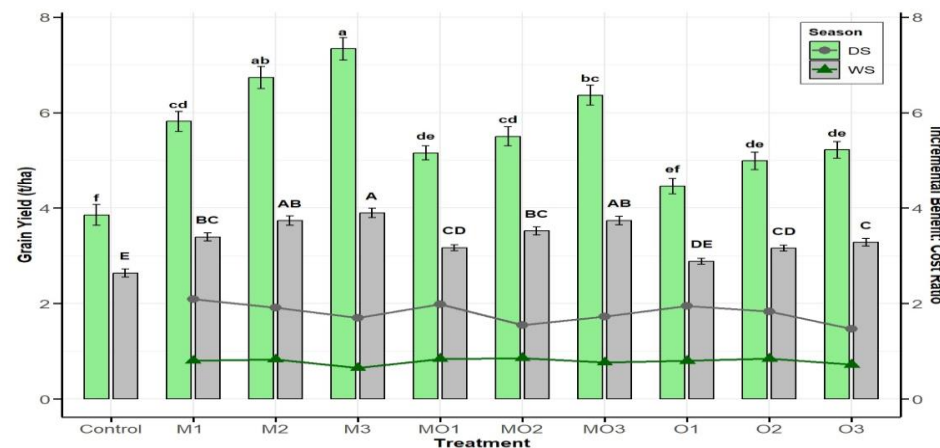
Salt-affected soil

Agronomic R&D innovations 2025

Optimizing fertilizer use

Rice profitability depends on **fertilizer rate; type and cropping season** in Madagascar

Only rates below 50 N kg/ha is profitable – under current price of paddy/Fertilizer

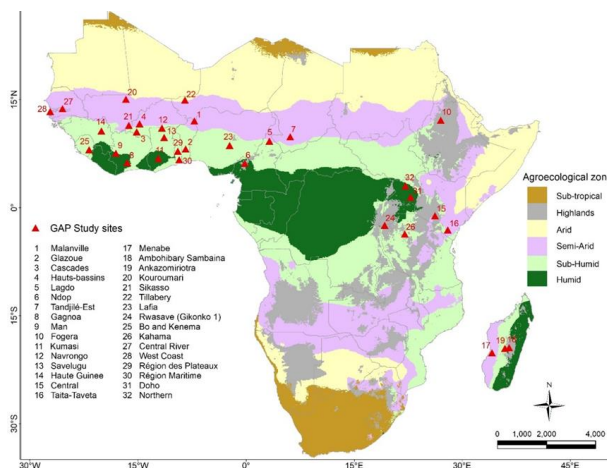


Grain yield and IBCR across treatments and seasons

GAP & GAP dissemination

Yield gain with GAP: **1.0 t/ha (overall)**, 1.1 (RL), 0.9 (RU) & 0.7 (IL) t ha⁻¹ (19 countries)
 GAP reduced yield variation by 29, 24 & 20% in RL, RU & IL, respectively

> 2000 farmers trained on GAP in Madagascar and Comoros alone



Rice quality and nutrition improvement

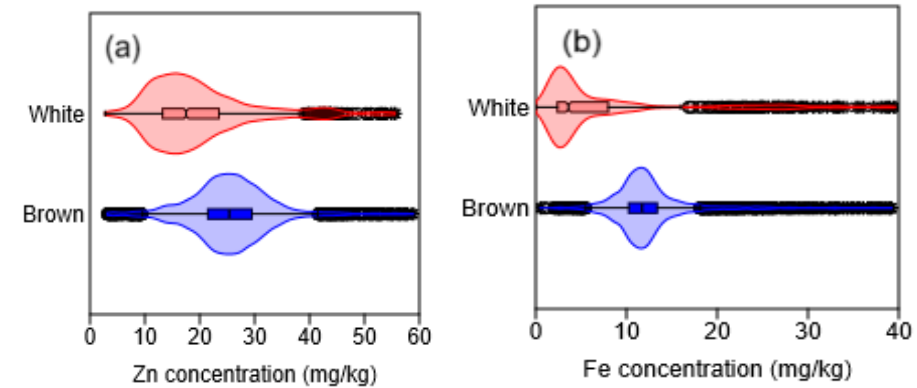
Zn & Fe human health targets

Breeding targets: Zn (28 mg kg⁻¹) and Fe (15 mg kg⁻¹) in polished rice

Zn-biofortified cultivars had 9.8% higher grain Zn concentrations. No effect on Fe

Zn and Fe fertilization increased the probability to 41.3% and 67.7% for Zn and Fe, resp.

Combined use of genetic and agronomic fortification, and parboiling are needed



Agronomic Zn fortification

GxExM interaction effect being studied in Madagascar, Cote d'Ivoire and Senegal

Zn biofortified varieties; Red rice; local check with Zn foliar & soil application

Result: **ZnFoliar is effective than ZnSoil**; Soil applied Zn get fixed?

Dilution effect at higher yields



Climate-Resilient Rice-Based Systems in Africa

Climate-resilient rice varieties

- Drought, flood, salinity, and cold tolerant varieties
Yield gains under stress: +1.0 to +4.5 t/ha

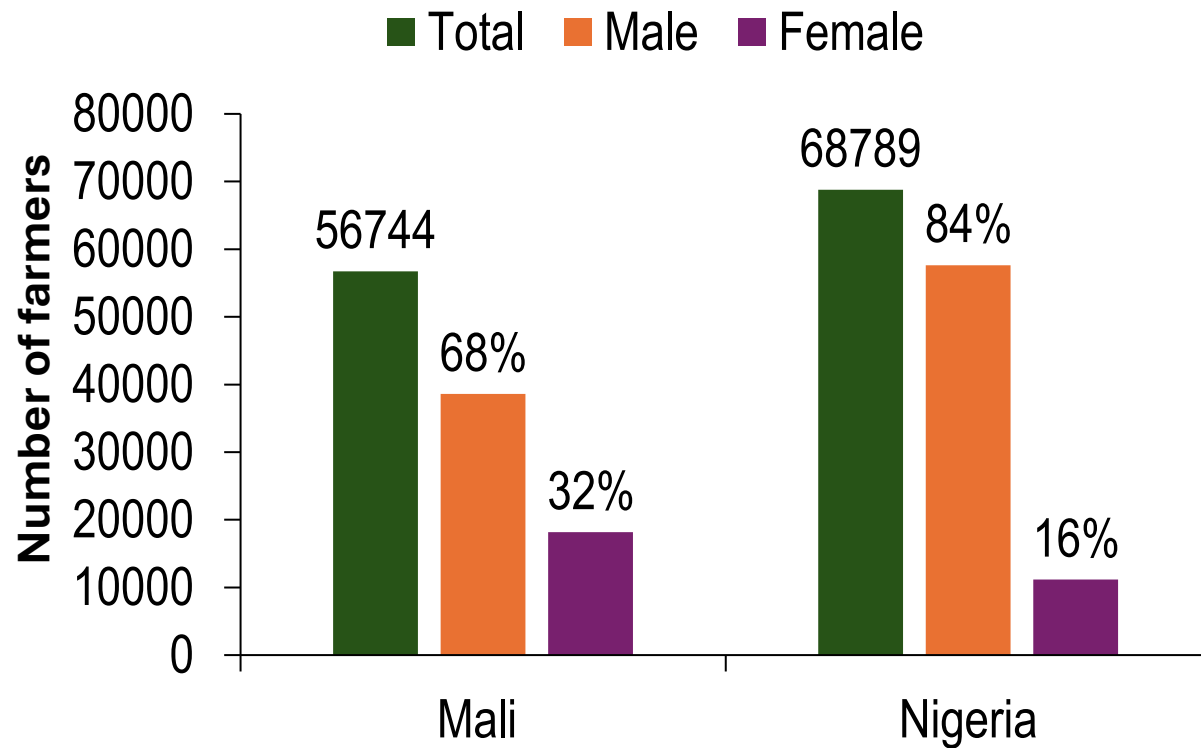
Climate resilient rice production systems

- Smart-Valleys, direct-seeded rice, alternate wetting & drying (AWD)
- Conservation agriculture, biochar, integrated rice–fish, ratoon rice
Reduced drought, water scarcity and flooding impacts and enhanced diversification
Yield increase: +20–60% | Water saving: 20–60%
Reduced methane emissions (30–60%) | Increased soil carbon and improved soil fertility

Dissemination of digital agronomy advisory - RiceAdvice Lite

Scaling RiceAdvice Lite

RAL increased yields by 17–27%, adding 0.4–1.1 t/ha across locations
Net profits rose by 25–67%, with gains of \$104–256/ha using RiceAdvice Lite



- ❑ RAL reached large farmer numbers in Mali (56,744) and Nigeria (68,789)
- ❑ However, women remain underrepresented with 32% in Mali and only 16% in Nigeria showing that rapid scaling has not closed gender gaps in digital agronomy access
- ❑ Currently being validated under FSRP in Madagascar

Scale Appropriate Mechanization in Madagascar

Design and evaluation of technically sound, socially acceptable, and economically viable mechanization solutions aimed at reducing labour demand, improving livelihoods, and adapting to heterogeneous production systems.



Manual push weeder



Seeder and Fertiliser seeder



Motorized weeder



Land Preparation model



Mechanized Direct Seeding of Rice



Solar pump

Planned R&D work in 2026 and beyond

- Crop modelling and agricultural advisory
- Smart-Valley knowledge hub and implementation
- AfricaRice's AI capability enhancement and readiness
- Ratoon rice – Land suitability and system integration; on-farm validation
- Research on Striga management – continuation
- Rice area and yield mapping
- Soil health and salinity management
- RiceAdvice Lite validation and dissemination in new states (Nigeria) & countries
- Direct Seeded Rice (DSR) in Senegal, Cote d'Ivoire and Madagascar
- Scaling GAP, RAL, Scale Appropriate Mechanization (Weeders, Mechanized DSR, Solar Irrigation)

Critical capabilities

- ❖ LTE in Cote d'Ivoire and Senegal
- ❖ Agronomy & soil lab services

Thank you for listening