



Rice Related Research Activities by IRRI

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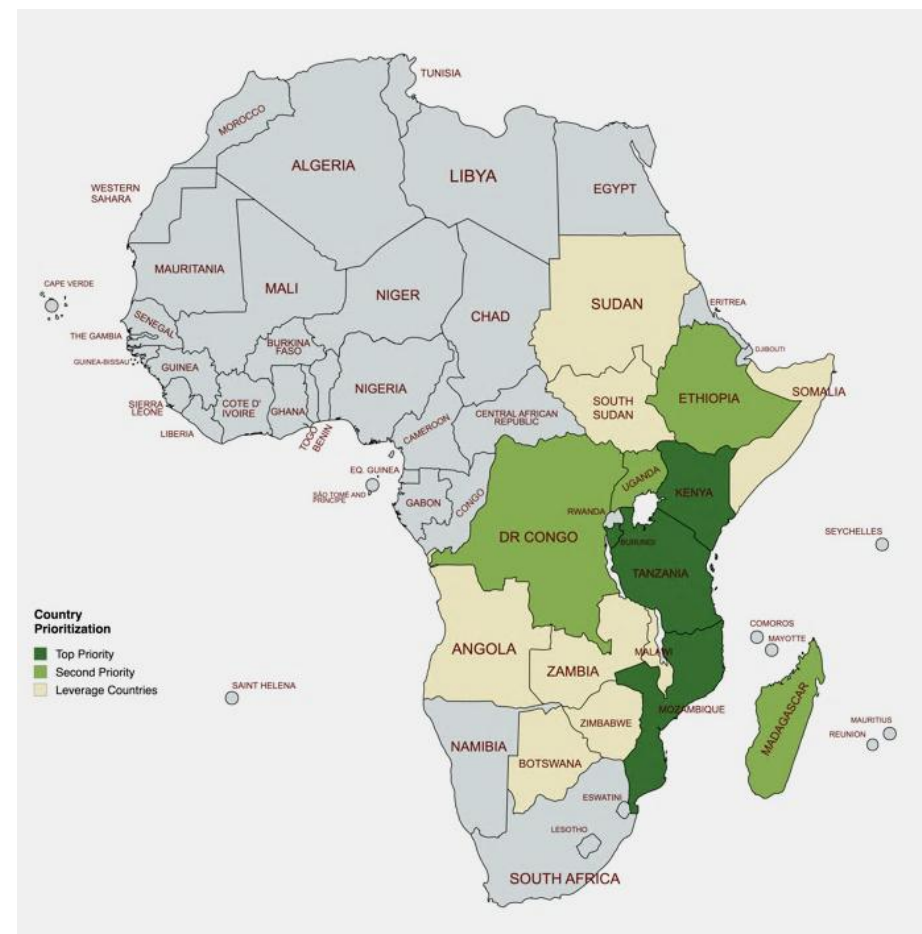
Opportunities

- Vast untapped resources
- Better varieties and management systems – several new varieties released recently.
- Strong will and support by governments
- Infrastructure and human capacity is being built for successful rice-based systems
- Engaging private sector for effective input and output market access
- Policy reforms to support critical players
- Importance of reduction of impact on human and environment health

Major research areas

- Deploy high yielding, nutritious and climate resilient varieties via effective seed systems
- Efficiency: modernize production systems, reduce postharvest quality & quantity losses, improve production and income
- Manage soil health, water and nutrient
- Build infrastructure & human capacity
- Catalyze policy reforms & cross-learning to speed progress and impacts – faster variety release, effective value chains, competitive products, cross border exchange
- Reducing impact on human & environment health

	Country	No. of Varieties
1	Burundi	19
2	Tanzania	04
3	Kenya	06
4	Mozambique	07
5	Malawi	05
6	DRC	07
7	Uganda	03
8	Somalia	03
9	Zambia	03
10	Sudan	02
	Total	59



Inclusive Markets and Value Chain – progress from 2022 -2026

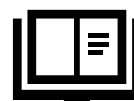
Rice miller surveys evaluating mills, capacity, grain sourcing, value chain upgrading and market linkages

Rice Product Market Segmentation in Tanzania, Kenya and Ethiopia.

Country	Commonly milled varieties	Preferred characteristics	Important grain quality parameters
Uganda (n = 485)	K85 (KAISO), K5 (KAISO 2), K98 (KAISO 1), NERICA, Wita 9, SUPERICA,	Early maturing, high yield, lodging disease resistant, adaptable to drought, flooding and nutrient deficiencies	Moisture content, grain purity, weight, dimension, and color
Kenya (n = 105)	IR05N221 (Komboka) and Basmati 370	High yield, early to medium maturity, semi-aromatic/ aromatic, high market value	Moisture content, grain purity, dimension, weight & color
Tanzania (n = 121)	TXD 306 (Saro 5) and Mbawambili	Semi-aromatic/ aromatic, high-yielding, adaptability	Moisture content and grain purity

Country	Ecosystem	Maturity	Preferred grain shape	Product design important traits				
				Type	Nutrients	Abiotic	Biotic	Agronomic
Ethiopia	Upland, rainfed, cool-elevated	Early (100-115 days) & medium (115 to 125 days)	Medium (length: breadth 2.1 – 3.0) & long (>3.0)	Aromatic	Zinc content	Drought tolerant	Blast, sheath blight, brown spot-resistant	Nutrient and water-use efficiency
Kenya	Irrigated lowland	Early (100-115 days) & medium (115 to 125 days)	Medium (length: breadth 2.1 – 3.0) & long (>3.0)	Aromatic	Vitamin A, iron, Zinc content	Drought	Blast, sheath blight, brown spot-resistant	Nutrient and water-use efficiency, weed resistance
Tanzania	Rainfed lowland irrigated lowland	Early (100-115 days) medium (115 to 125 days), late (>125 days)	Long (length: breadth > 3.0) & bold (1.1 – 2.0)	Aromatic	Vitamin A, iron, Zinc content	Drought & salinity	Blast, Bacterial leaf blight, Rice yellow mottle virus RYMV) resistance	Nutrient and water-use efficiency, weed resistance

- Rice miller study in Mozambique (n = 211) to be analyzed
- Nutrition Policy Analysis conducted in Tanzania
- Assessment of Biofortification Strategies for East Africa



Connor M., Atnaf M., Malabayabas, A., Anbacha A., and Bazie, M. 2025. Rice seed market segments for Ethiopia. Market Intelligence Brief Series 33, Montpellier: CGIAR.

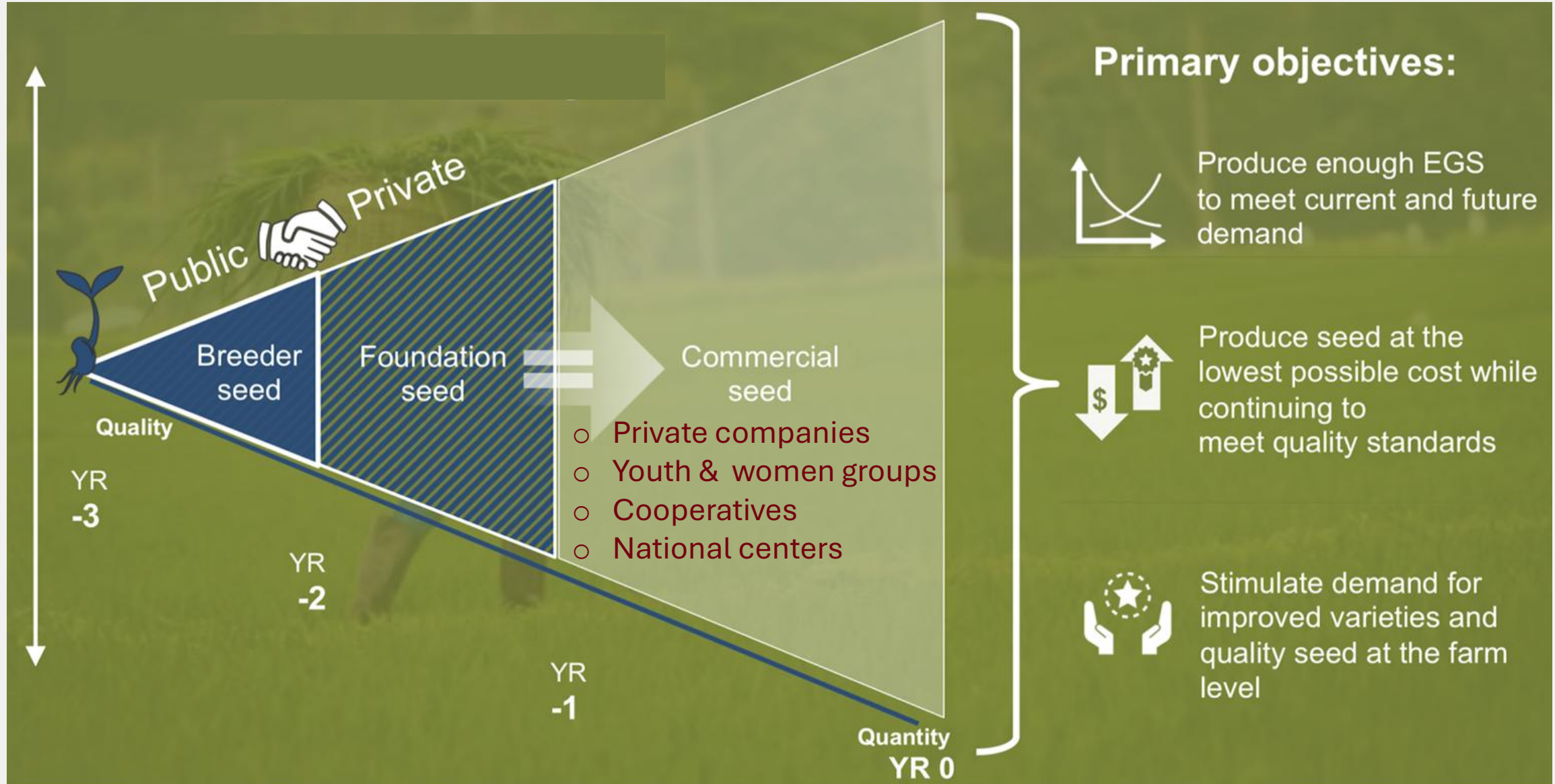
<https://hdl.handle.net/10568/178830>

Creating robust Seed Systems

- Better varieties: replacing old varieties with modern high yielding resilient varieties for food security
- Improve awareness of and access to seeds at affordable prices
- Ensure access to input and output markets.
- Building infrastructure and human capacity to support both formal or semi-formal seed system,
- Engage relevant scaling partners – private sector, cooperatives, women and youth groups, etc.
- Catalyze relevant policy adjustments to support critical players



Transitioning to “Formal” high- quality seed production



Resilient varieties and agronomic options for higher productivity & reduced GHG emission

- **CLIMATE ADAPTATION:** Adapt rice ecosystems to the effects of climate change
 - Varieties tolerant of abiotic stresses
 - Management options that improve productivity and reduce the impact of climate change
- **CLIMATE MITIGATION:** reduction in GHG from rice farming systems
 - Short maturing, low emission varieties
 - Proper management (Laser leveling, DSR, proper water, fertilizer, and solid waste management, etc.)

Climate resilient production systems and value chains

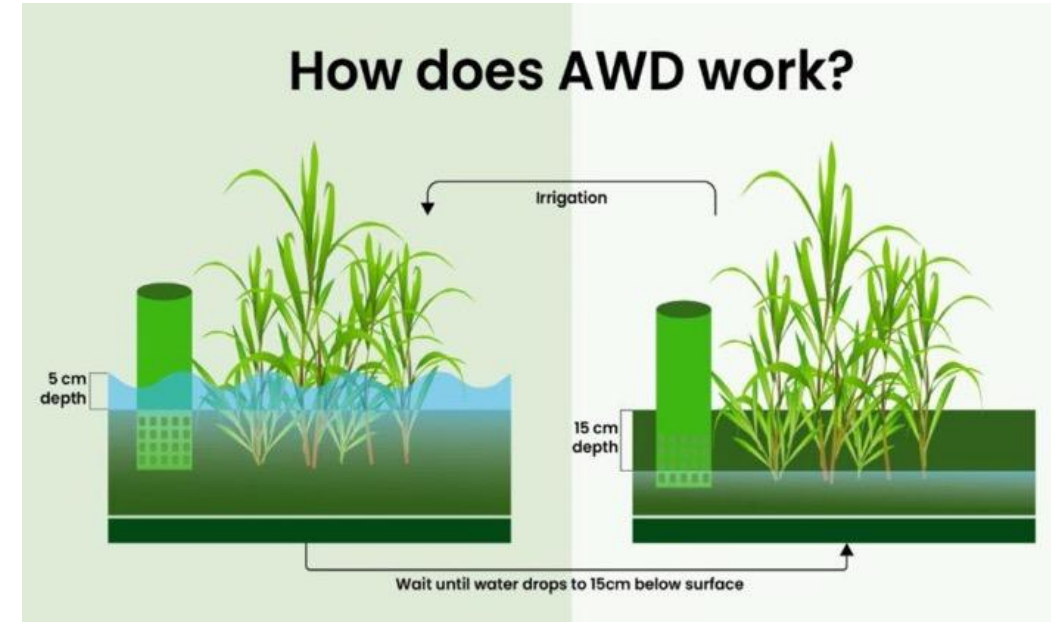


Management for better productivity and CC mitigation options:

1. Alternate Wetting & Drying (AWD)

Low-cost, using a half-buried tube to check subsurface water levels

- Can reduce water use by up to 30% without significant yield penalty,
- Suppress growth of methanogenic bacteria & methane emissions by 30-70%
- Key component in GHG mitigation strategies and carbon credit; being adopted by countries in South and Southeast Asia
- Have some health benefits:
 - Breaking the breeding cycle of mosquitoes
 - Reduce heavy metal uptake – Arsenate, Lead and Cadmium



2. Direct Seeded Rice (DSR) for CC mitigation



- Save water (>25%) and methane emission (>30%)
- Save labor and reduce drudgery
- higher net income (US\$100- 120 ha⁻¹)
- Positive effects on yield of succeeding crops

Drivers of Shift

Labor shortage

Water shortage

Rising cost

Mitigating GHGe



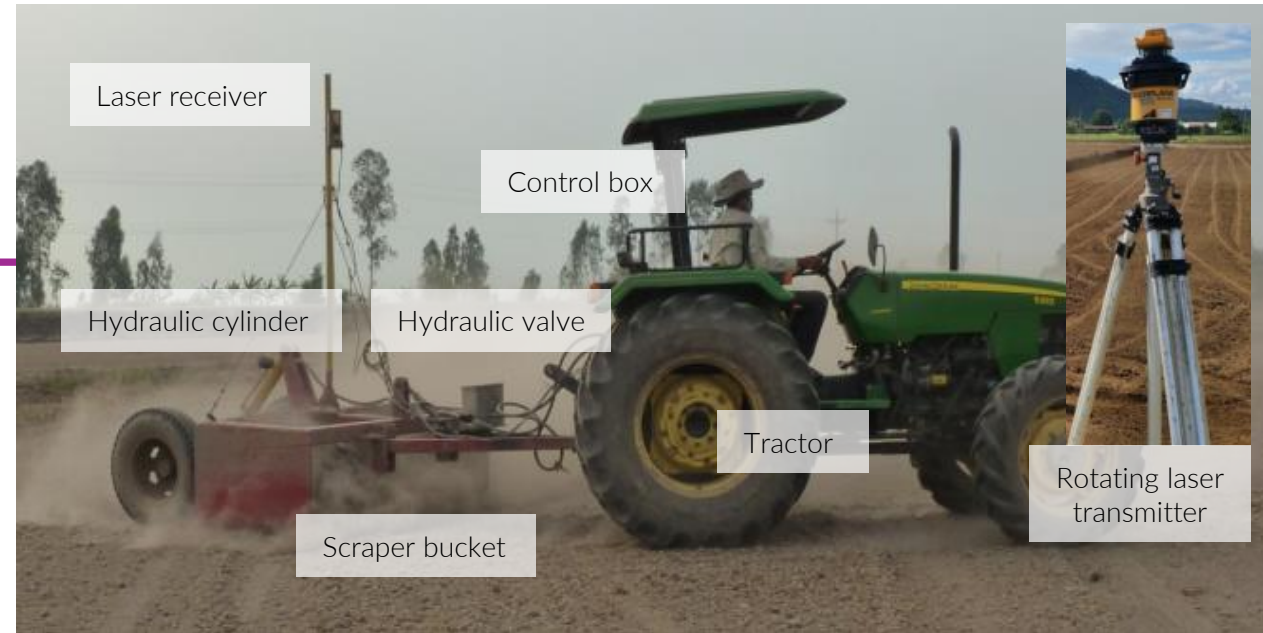
Alternate Wetting and Drying – Direct seeded rice



3. Laser Land Leveling

- Reduce water usage by 20-40% and irrigation pumping fuel by 30-60%
- Reduces seed rate by 40% and saves on fertilizer and pesticide by 10-13%
- **Can reduce direct methane emission by ~ 20%**
- Good germination, growth, and uniform maturity, reduce postharvest losses by 2-5% and increase yields by 5-15%

Data collected and adapted from IRRI field trials in Vietnam and Cambodia



Poorly levelled field



Well-levelled field

4. Solid waste management & value addition

- Avoid burning of straw reduce air pollution and GHGs, provide added value to farmers using rice solid wastes
- Sustainable uses of rice straw:
 - Incorporation into rice field for nutrients
 - Biochar for carbon sequestration
 - Supplementary feed for ruminants
 - Substrate for mushroom production
 - Biofuel for cooking or heating
 - Raw material for innovative products; e.g. food products, bioplastics, Compressed Agricultural Fiber (CAF), cement manufacturing, building blocks, handcrafts, etc.



RICE STRAW AS SUPPLEMENT
RUMINANT FEED



Satellite-based Rice Production Monitoring Digital Platform – Acreage, Yield, Climate-Driven Crop Damages

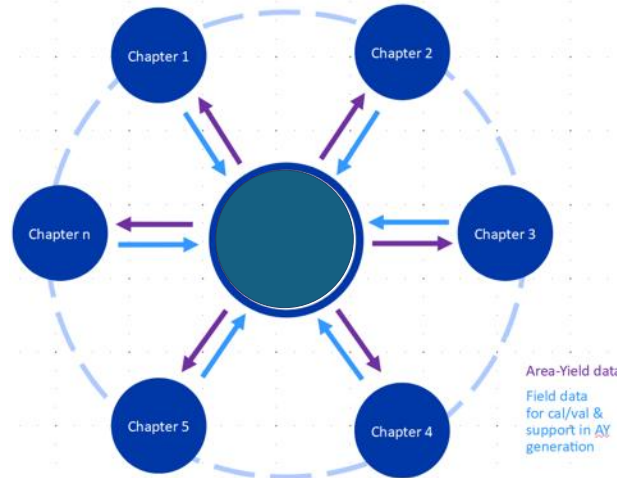
Global

Regional (next goal)

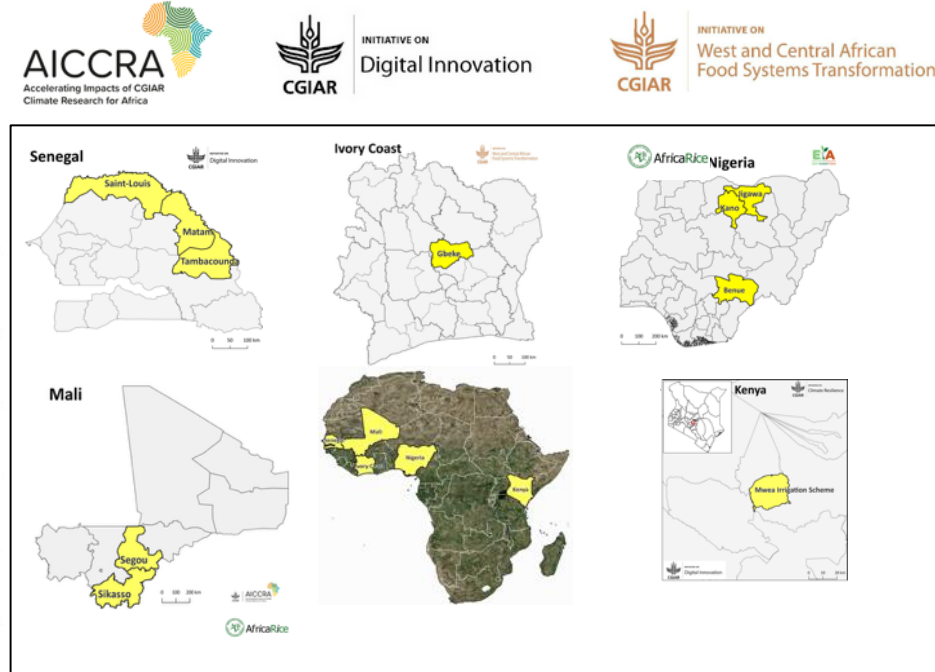
National



ECOWAS
CEDEAO



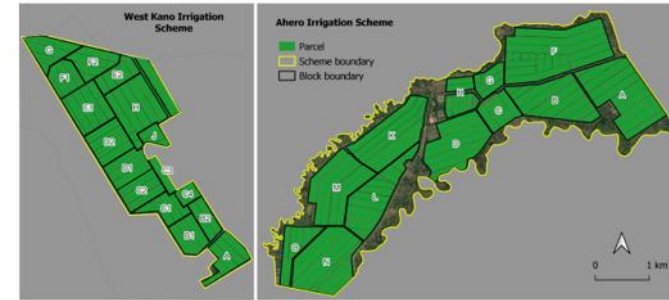
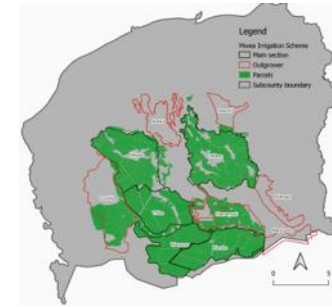
Area-Yield data
Field data
for cal/val &
support in AY
generation



→ **Leverage digital tech (remote sensing, crop modeling, web) to generate rice production information**

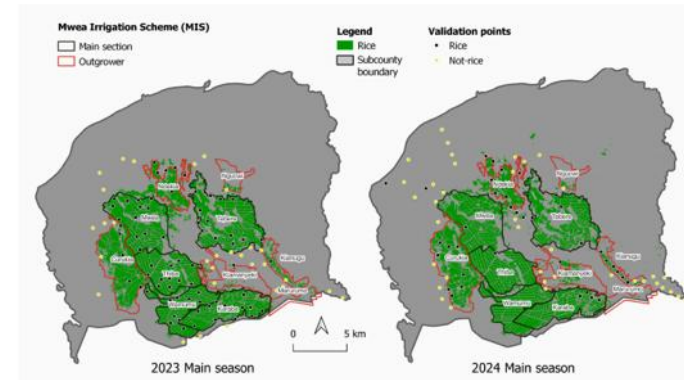
- Provide to **governments** updated and reliable crop information
- Monitor **within season** rapidly and timely **flood and drought impacts** on crop performance
- Support upscale and **site-specific climate smart activities**
- Secure **farmer** income by facilitating **insurance scheme** (and timing) for drought and flood damages

Kenya

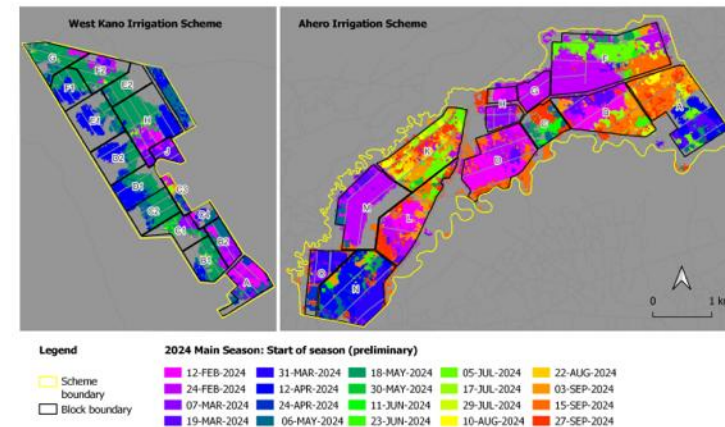


- Rice area and yield assessment in Mwea Irrigated Scheme (80% rice production in Kenya) in 2023-24 (with NIA and KALRO)
- RA: 92-95% accuracy
- Extended to irrigated schemes in west Kenya (Ahero, etc) in 2024
- Field experiment for variety calibration Basmati and Komboka under irrigated ecosystems
- Training RIICE workshop in December 2025 (KALRO, NIA, RCRMD, University)

Mwea Irrigation Scheme (left) and Western Kenya Irrigation Schemes (right, West Kano, Ahero)

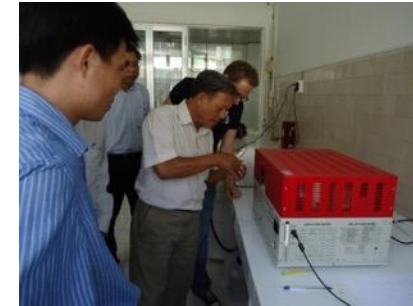


Mwea Irrigation Scheme rice area main season 2023 and 2024



SoS Western Kenya Irrigation Schemes (plantation managed according to water resource availability)

- Developed land and water resources for field trials
- Greenhouses and analytical laboratories
- Crossing facility; Rapid Generation Advance- 3.5 seasons/yr
- Abiotic stresses: Rain-out shelters, Submergence and salinity screening facilities
- Pathology screening facilities
- Hands-on and degree training:
 - Seed production purification and handling
 - Use of mobile device for data collection
 - Farmers: good management practices and use of Apps to timely access information
 - Annual courses, in-country or abroad
 - MSc and PhD students





African Climate
Action Plan
Partnering on climate



Thank you