A FLAGSHIP PROJECT OF THE RICE CRP: SUSTAINABLE FARMING SYSTEMS

K Saito, S Beebout, D Johnson, K Senthilkumar,

Y Tsujimoto, T Nishigaki, P Autfray, O Husson

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k.saito@cigar.org

XIII Conferencia Internacional de Arroz para América Latina y el Caribe

"Alianzas para la sostenibilidad de la producción arrocera"

Mayo 15 al 18, 2018 – Piura, Perú

XIII Conferencia Internacional de Arroz para América Latina y el Caribe

Content

- Description of RICE CRP & Flagship project
- Their objectives & activities in this flagship project
- Key products and research progress

CGIAR | RESEARCH PROGRAM ON Rice

GLOBAL CHALLENGE AND GLOBAL THREATS

- Global demand for rice will increase by >10% until 2030
- Less and more expensive resources (land, water, labor)
- More hostile environment (climate change, abiotic and biotic stresses)
- Environmental sustainability

CGIAR | RESEARCH PROGRAM ON Rice

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CGIAR RESEARCH PROGRAM ON Rice

The CGIAR Research Program (CRP) on rice agri-food systems

Africa Rice Center – Centre du riz pour l'Afrique – AfricaRice

CIAT International Center for Tropical Agriculture

IRRI

cirad

IRD Institut de Recherche pour le Développement FRANCE

JIRCAS

RICE CRP

- A global partnership led by IRRI
- ≈ 900 partners (public, private, academics, development, NGOs)
- For a value of ≈ 80-100 M $/year (through CGIAR. In 2018: 15.75 M$ core, 63 M$ bilateral)
- 2017-2022 (GRiSP: 2010-2016)

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RICE CRP targets

Reduced poverty

Farm households with improved practices

17 million

People out of poverty

14 million

Improved food and nutrition security for health

People out of hunger

17 million

People out malnutrition

8 million

Improved natural resources systems and ecosystem services

Water and nutrient use efficiency

5%

Less emission per year

12 Mt CO_2-eq

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FIVE FLAGSHIP PROJECTS

ACCELERATING IMPACT & EQUILTY

UPGRADING VALUE CHAINS

SUSTAINABLE FARMING SYSTEMS

GLOBAL RICE ARRAY

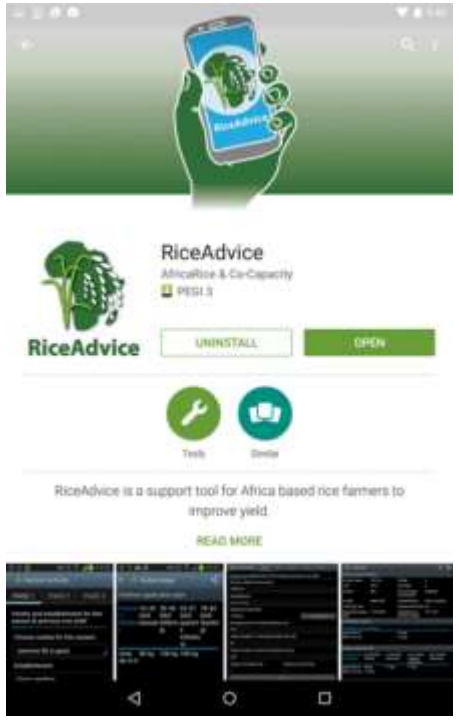
NEW RICE VARIETIES

FP3 Objectives

Develop & deliver

- improved crop management options
- improved harvest practices
- intensified & diversified farming systems

PRODUCTS



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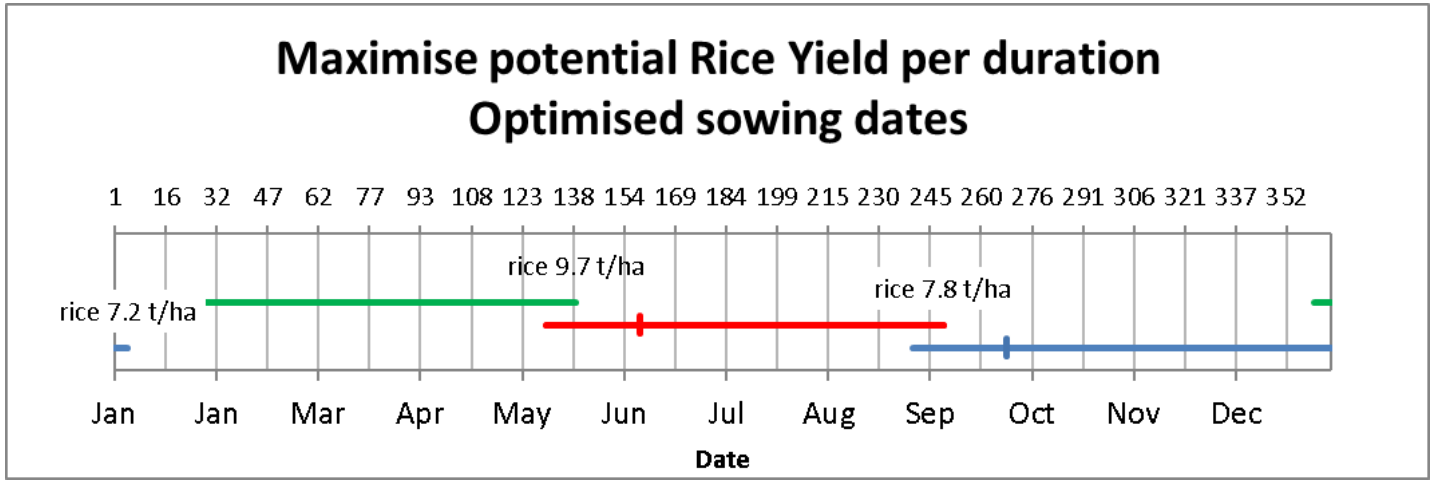
3.1. Farming systems analysis

- Identifies opportunities for diversification & intensification
  - Diagnostic surveys with focus on gender and youth
  - Participatory needs assessment
  - Simulation analysis tools
    - Yield gap assessment
    - Assessing current & new cropping patterns
    - Resilience and capacity to adapt to shocks in current and future climate

ORYZA2000 / ORYZA V3 (https://sites.google.com/a/irri.org/oryza2000/about-oryza-version-3)



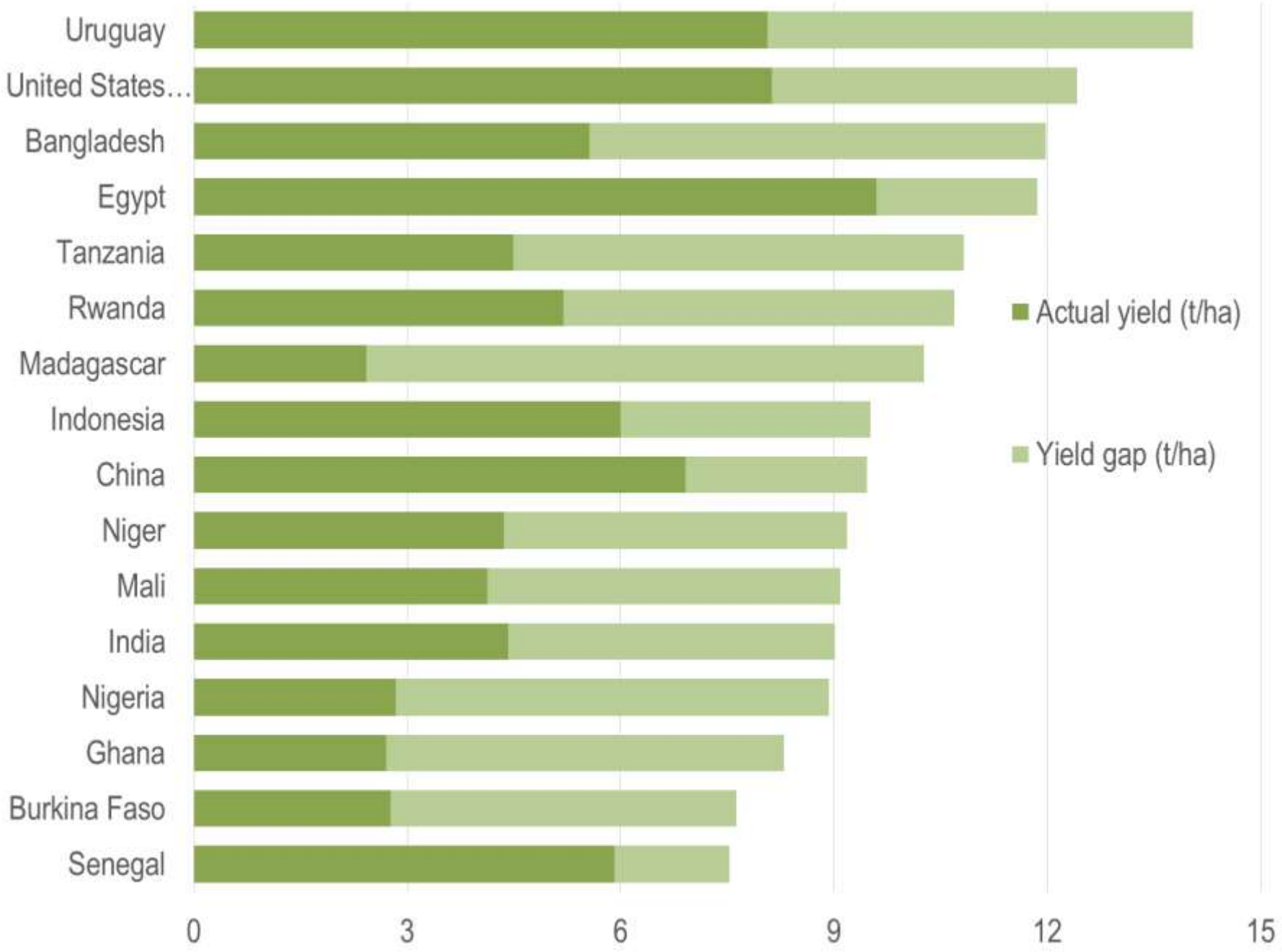
Yield gap assessment - irrigated rice -

	Actual yield (t/ha)	Yield gap (t/ha)
Asia (4*)	5.7	4.3
SSA (9)	3.9	5.3
Others (3)	8.6	4.2

* Number of countries.
In total, 66% of global area covered.

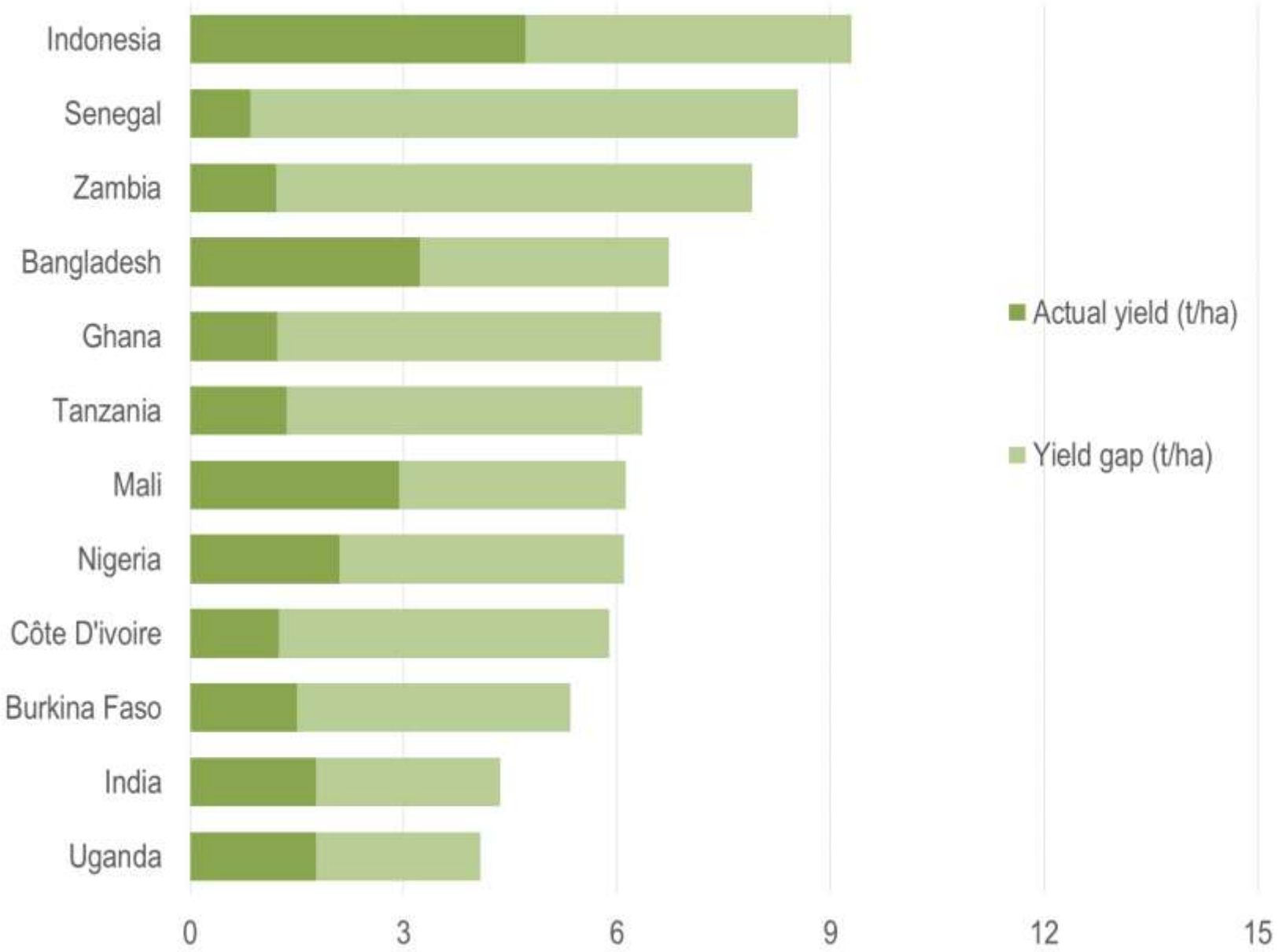
Global Yield Gap Atlas

http://www.yieldgap.org/



Yield gap assessment - rainfed rice-

	Actual yield (t/ha)	Yield gap (t/ha)
Asia (3)	3.2	3.6
SSA (9)	1.6	4.7



Global Yield Gap Atlas

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    - Resilience and capacity to adapt to shocks in current and future climate
  - Develops, validates, and scales up multi-dimensional sustainability indicators for analyzing environmental, socioeconomic, and biophysical aspects of rice-based farming systems

SRP Sustainable Rice Platform

Sustainable Rice Platform (SRP)

- http://www.sustainablerice.org/
- A multi-stakeholder partnership to promote resource efficiency and sustainability, led by IRRI and UN Environment
- World's first science-based rice sustainability standard and performance indicators
- 2016: pilot tested in 7 countries: Pakistan, India, Vietnam, Cambodia, USA, Brazil (NatCap), and Thailand.
- 2017: Nigeria
- 2017-18: Under revision

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SRP Standard

Water use

Nutrient management

Pre-planting

Health & safety

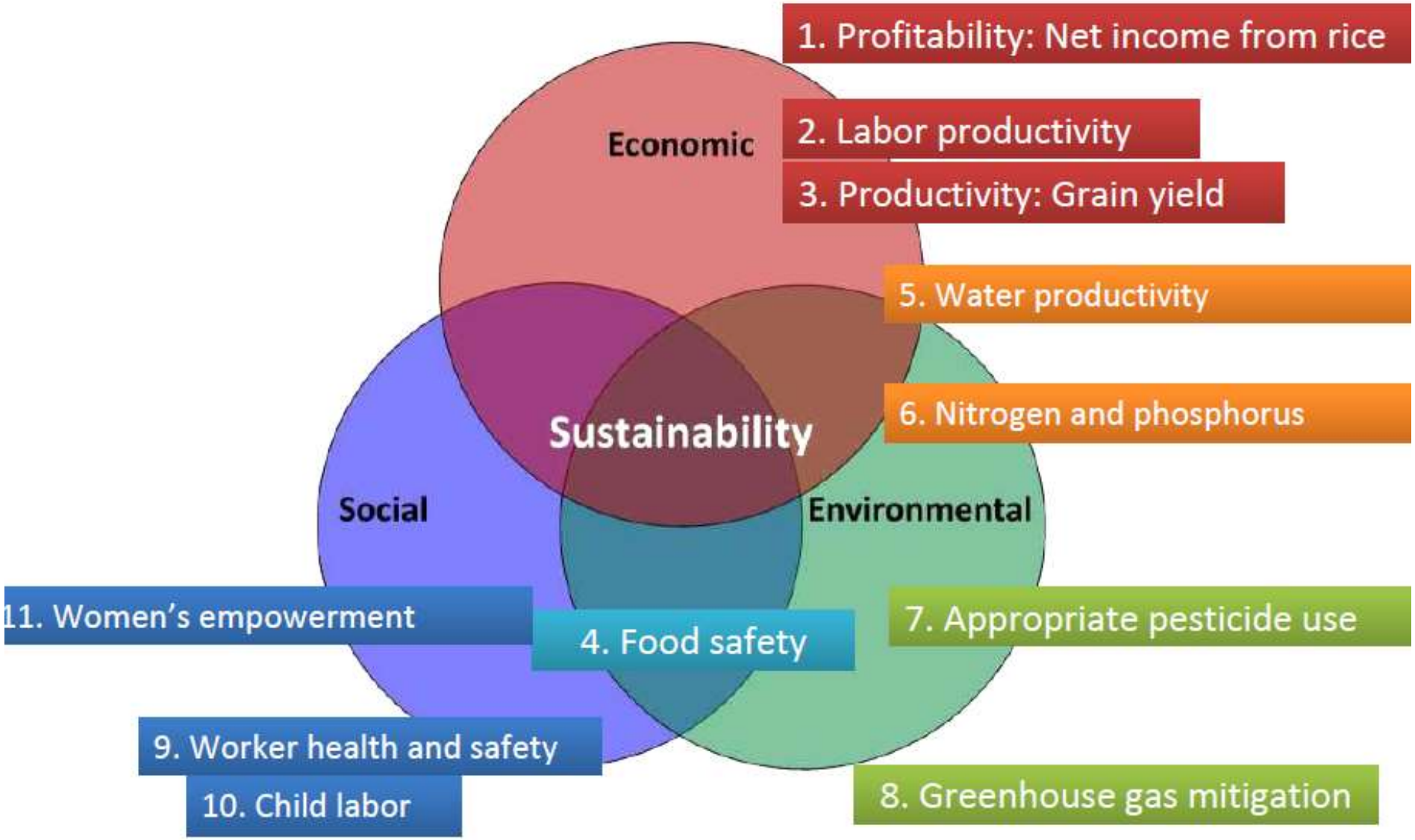
Harvest & post-harvest

Farm management

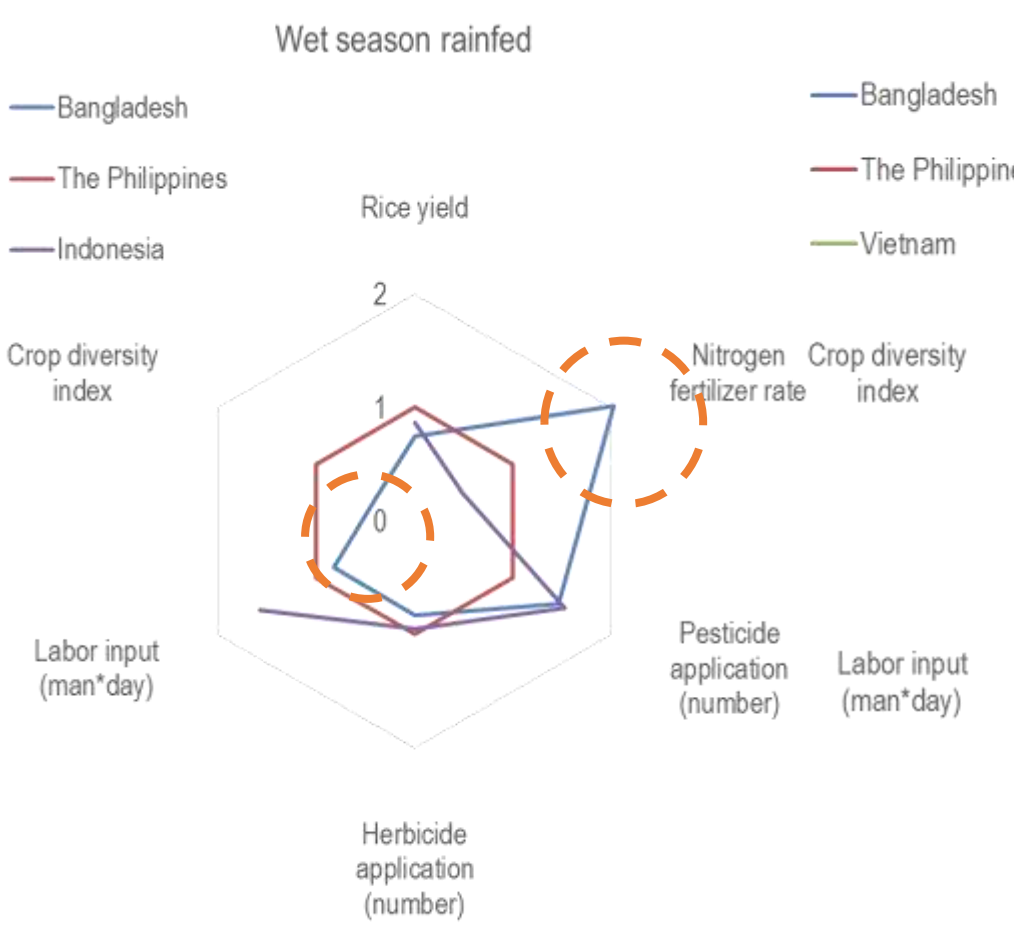
Labour rights

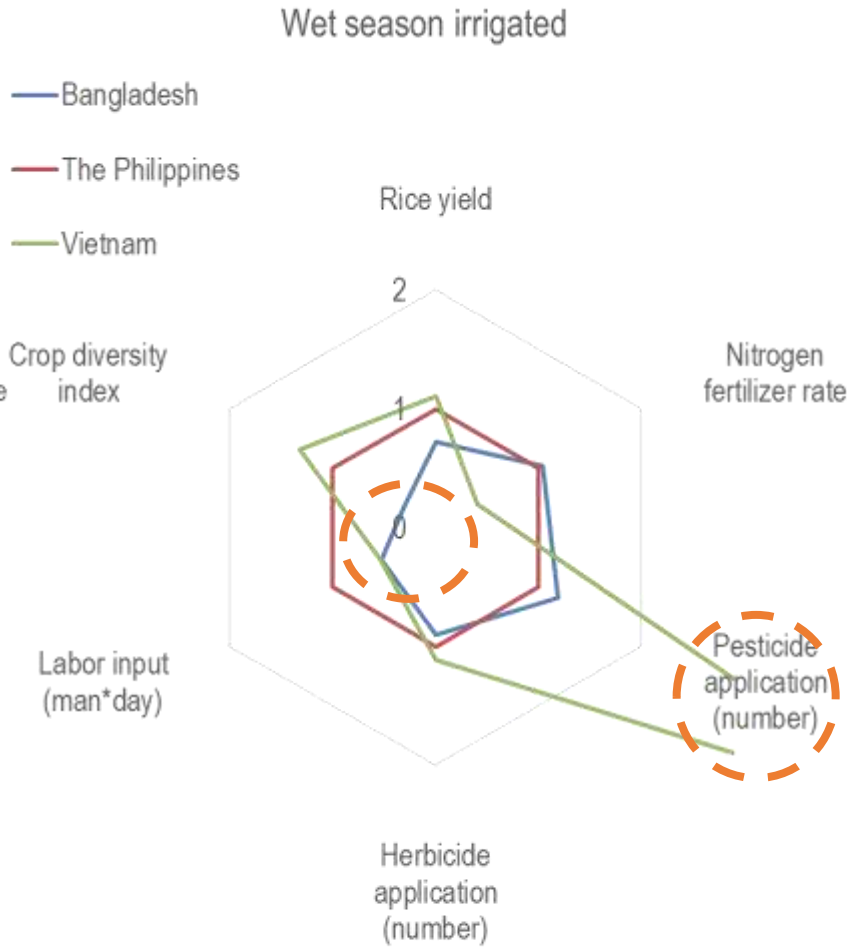
Pest management

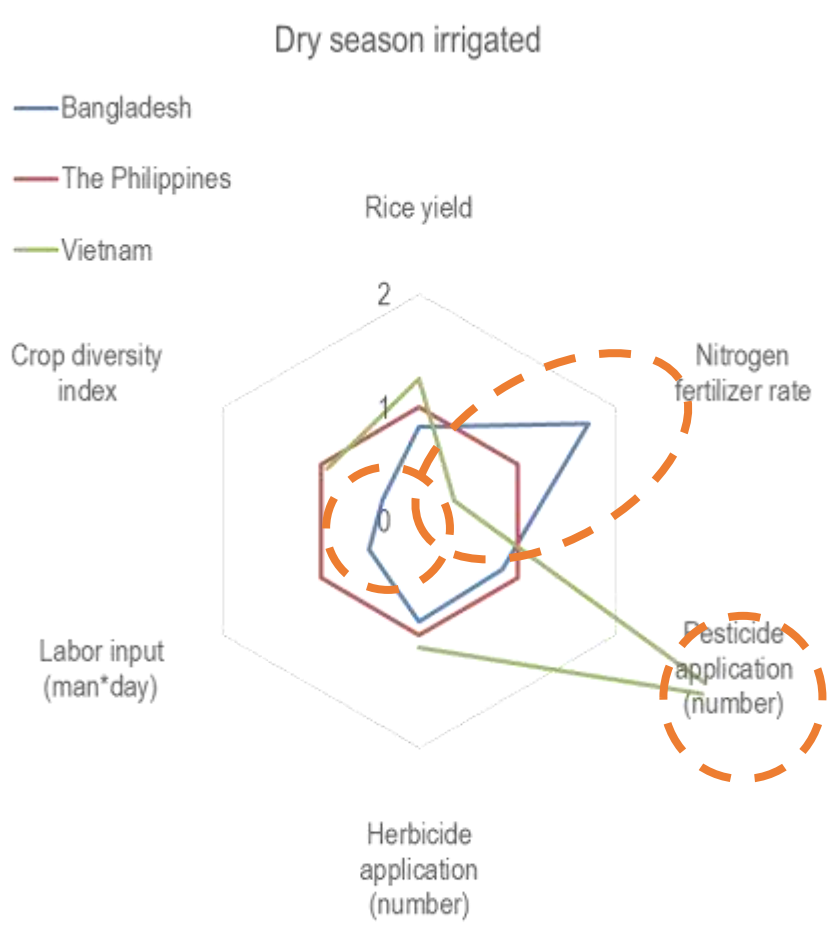
SRP performance indicators



Multi-dimensional sustainability indicators (Philippines = 1)







(RICE Asia outcome indicators, http://www.grisp.net/main/summary)

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3.2. Intensification and mechanization

Develop & deliver improved crop management options, such as

- Rice Crop Manager
- RiceAdvice
- Alternate wetting and drying (AWD)
- Combinations of stress tolerant rice varieties & management practices
- …..

Rice Crop Manager & RiceAdvice - ICT tools for increasing yield and income of farmers

Fill in farmers' personal condition

Get a personalized, pre-season advice

	Rice Crop Manager (RCM)	RiceAdvice
Developer & Target regions	IRRI, Asia	AfricaRice, Sub-Saharan Africa
Spec	Web-base; internet needed for getting advice	Android (download through google play); off-line
Recommendation	Fertilizer management Seed rate for direct seeded rice Weed management Water management Pest management	Choice of fertilizer types Fertilizer management Weed management (available in another tool named "RiceAdvice- WeedManager")
Major countries promoted	The Philippines, India	Nigeria, Mali
Benefit	Yield increase: 0.4 (the Philippines) to 1 t/ha (India) Income gain: 100 to 200 USD/ha	Yield increase: 0.6 to 1.8 t/ha Income gain: 100 to 250 USD/ha
Scale of reach	The Philippines: Over 1.3 million RCM recommendations India: 55,000 recommendations	Over 40,000 advices
Key users	Public extension services	Public, scaling partners & value chain actors (youth)
Challenges	• Micro-nutrient application (e.g. B, Zn, S, Mg; Si) • Precision agriculture (e.g. drone use; digital soil map) • In-season recommendation • Link with weather forecast (e.g. WeRise developed by JIRCAS/IRRI)	

Contents lists available at ScienceDirect

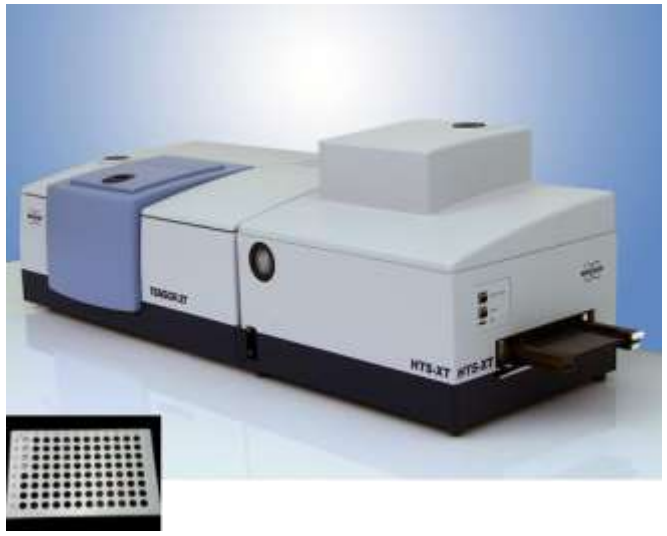
Agricultural Systems

journal homepage: www.elsevier.com/locate/agsy

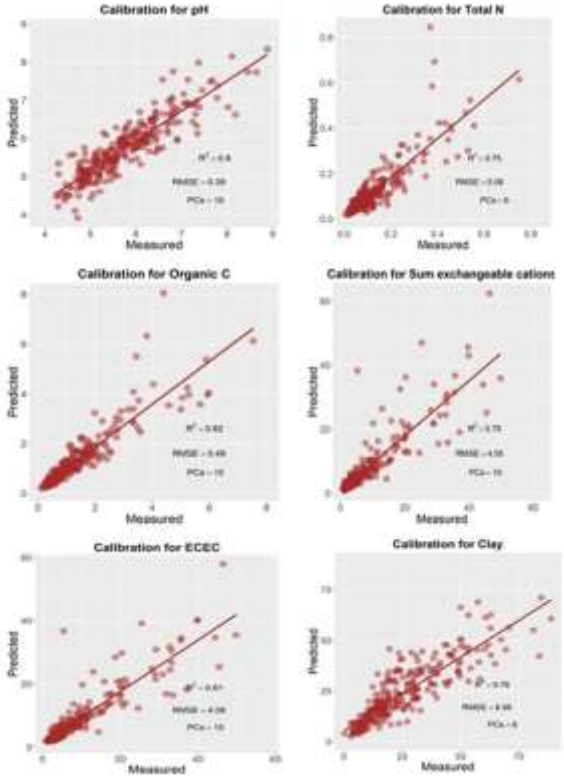
Reducing vulnerability of rainfed agriculture through seasonal climate predictions: A case study on the rainfed rice production in Southeast Asia

Keiichi Hayashi[a,b,*], Lizzida Llorca[a], Sri Rustini[c], Prihasto Setyanto[d,1], Zulkifli Zaini[e]

[a] International Rice Research Institute, Los Baños 4031, Laguna, Philippines
[b] Japan International Research Center for Agricultural Sciences, 1-1 Ohwashi, Tsukuba, Ibaraki 305-8686, Japan
[c] Central Java Assessment Institute for Agricultural Technology, Ungaran, 50501, Central Java, Indonesia
[d] Indonesian Agricultural Environment Research Institute, Pati, 59182, Central Java, Indonesia
[e] IRRI-Indonesia Office, Bogor, West Java, Indonesia



High-throughput screening through MIR



Testing of wide range of fertilizer application methods

- Application in nursery bed for transplanted rice
- Micro-dosing for direct seeded rice
- Foliar fertilizer application

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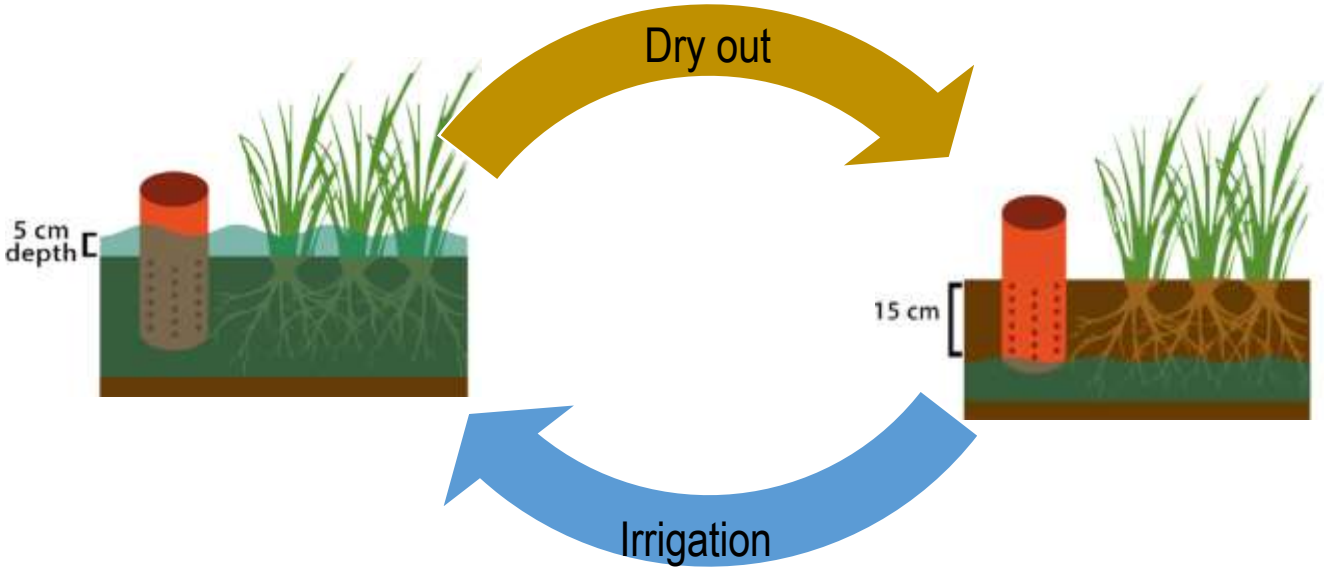
Safe alternative wetting & drying (Safe AWD)



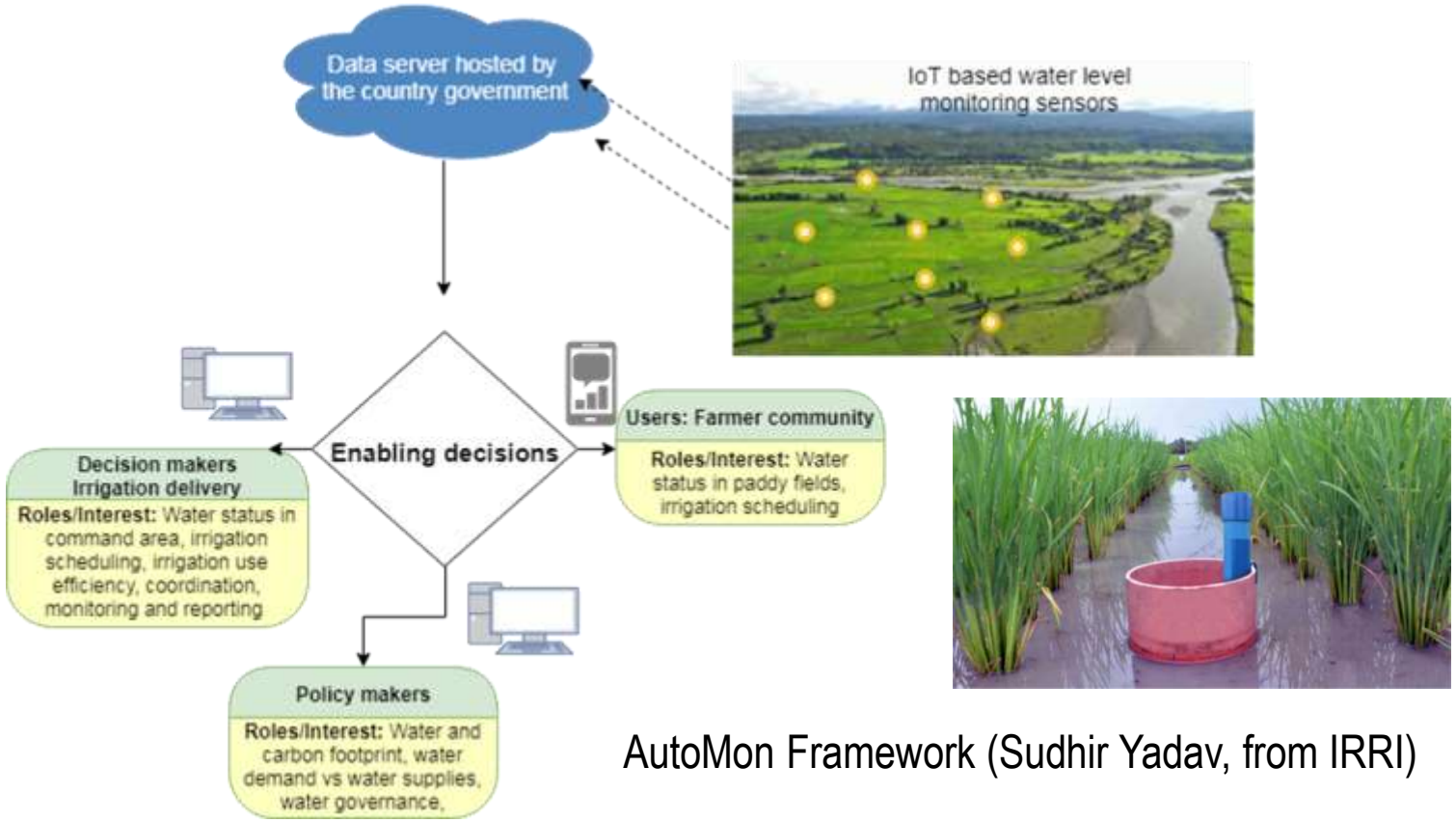
Reduce water use by up to 30%

Reduce CH_4 emissions by 50%

Save money on irrigation costs

On-going research related to AWD in Asia and Africa

- Testing in Africa (Burkina Faso, Madagascar, Senegal)
- Development of AWD suitability maps in Philippines & Vietnam
- Research on use of digital tools for automated monitoring water levels & decision making



AutoMon Framework (Sudhir Yadav, from IRRI)

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Stress tolerant varieties & management practices - R&D framework -

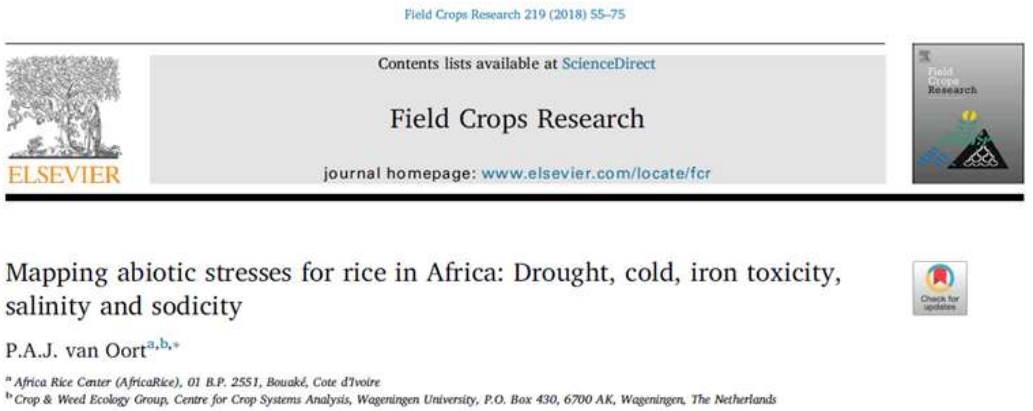
- Stress mapping (e.g. salinity, cold/heat, drought, Fe toxicity)
- Assessment of climate change on rice production
- Identify target domains for specific stresses
- Identify sowing time x cropping pattern x crop duration x N management through crop models
- Test other management options for alleviating specific stresses

PRIMARY RESEARCH ARTICLE

WILEY Global Change Biology

Impacts of climate change on rice production in Africa and causes of simulated yield changes

Pepijn A. J. van Oort[1,2] | Sander J. Zwart[1,3]



Field Crops Research 219 (2018) 55–75

Contents lists available at ScienceDirect

Field Crops Research

journal homepage: www.elsevier.com/locate/fcr

ELSEVIER

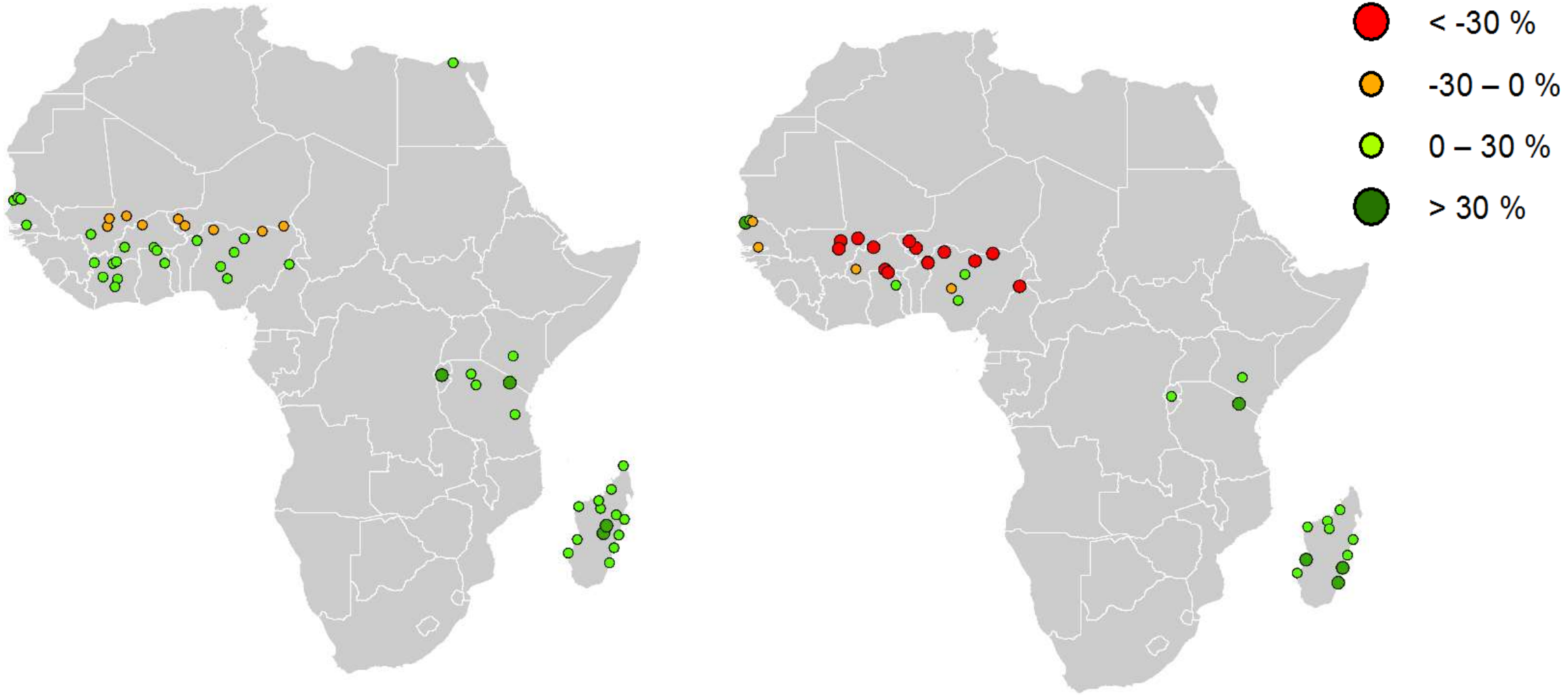
Mapping abiotic stresses for rice in Africa: Drought, cold, iron toxicity, salinity and sodicity

P.A.J. van Oort[a,b,*]

[a] Africa Rice Center (AfricaRice), 01 B.P. 2551, Bouaké, Cote d'Ivoire
[b] Crop & Weed Ecology Group, Centre for Crop Systems Analysis, Wageningen University, P.O. Box 430, 6700 AK, Wageningen, The Netherlands

Climate change on rice production in irrigated conditions

Results for most extreme scenario: RCP8.5, changes 2000-2070 (van Oort & Zwart, 2018)



Main season

Off season

3.3 Farm diversification

- Farm diversification as a major avenue to improving farmers' livelihoods
- **Whole-farm productivity, income, gender equity, labor productivity, diet diversity, and environmental sustainability**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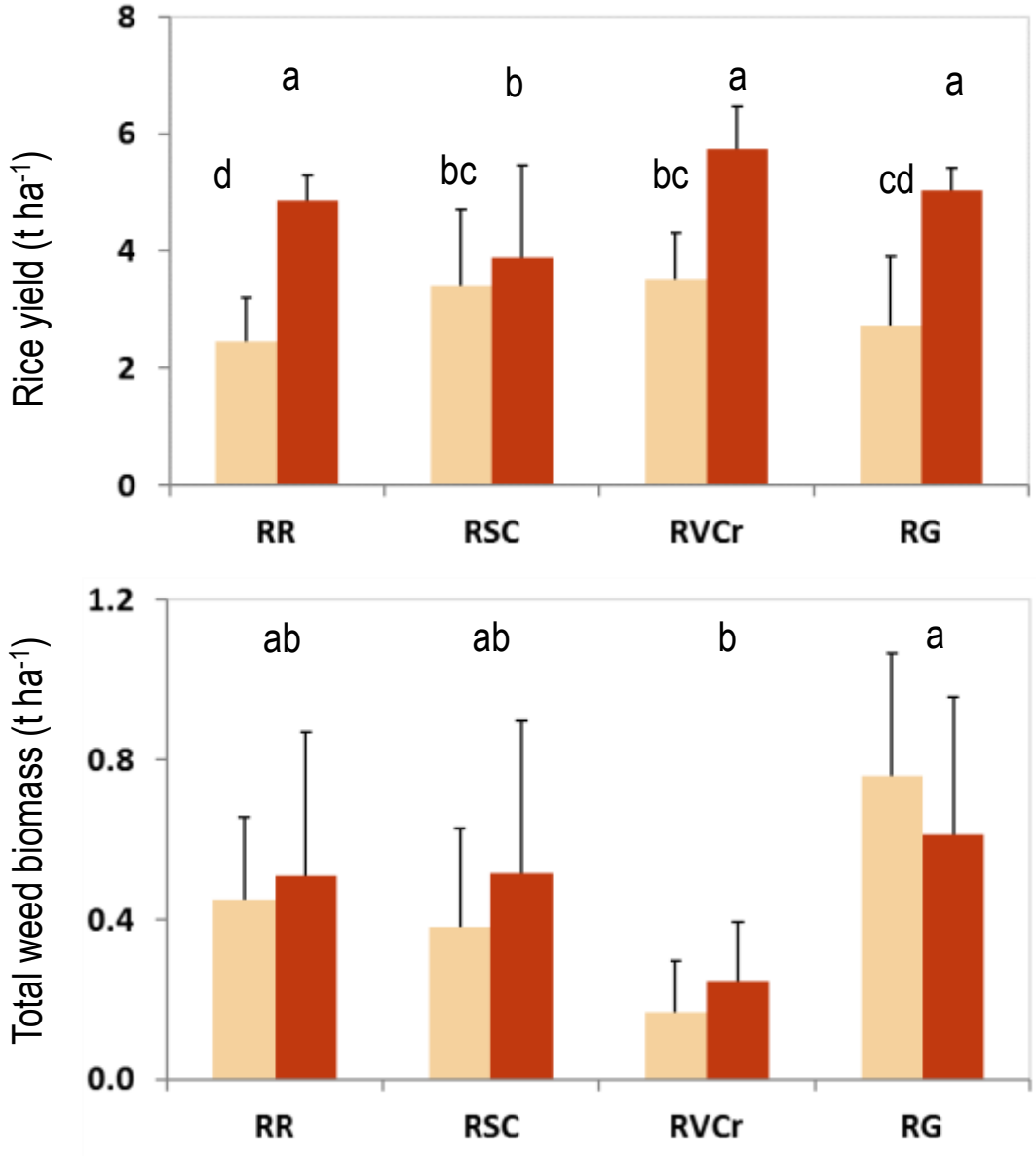
Upland crop rotation study in Madagascar (CIRAD)

Rice / Rice (RR)
Sorghum + Cowpea / Rice (RSC)
Velvet bean + Crotalaria / Rice (RVCr)
Groundnut / Rice (RG)

X

F1 : organic matter (light red)
F2 : manure + inorganic fertilizer (dark red)



Summary

- Farming systems analysis & multi-dimensional performance indicators can play a vital role
- A wide range of innovations are under development in FP3
- Up-/out-scaling innovations developed in FP3 is key for accelerating impact.
- New collaboration with research institutes in Latin America

Muchas gracias!!

k.saito@cigar.org

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http://ricecrp.org/