JIRCAS contributions to CARD

Progress Report at the 18th SC meeting

Africa Rice Farming System Project

JIRCAS (2021.4-2026.3)

Fertility sensing & Variety Amelioration Project

SATREPS (2017.5-2022.9)

Yasuhiro Tsujimoto

Project leader, JIRCAS

JIRCAS: Africa Rice Farming System Project

Project goal: To develop sustainable & nutrition-sensitive rice farming system by integrating water management technologies, breeding materials and cultivation technologies, and to provide them to the target countries

Engeneering for optimizing water use in paddy fields

Breeding for production and nutrition of rice and vegetables

Agronomy for resource-use efficient and nutrition-sensitive rice farming systems

CARD
RICE, Double rice production

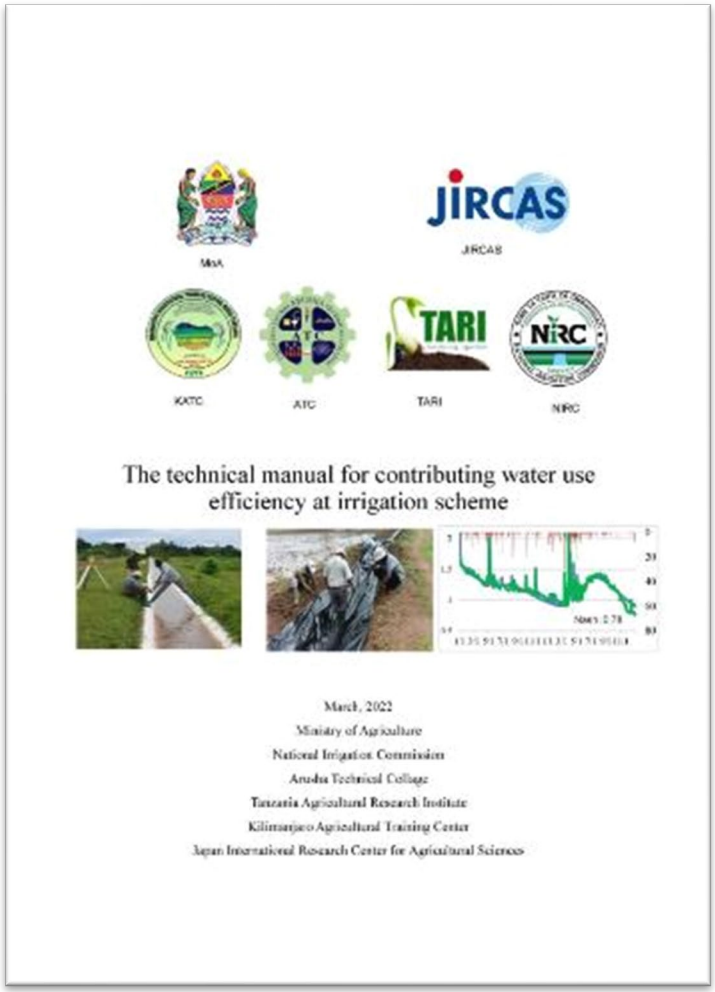
SHEP
Market-oriented, horticultural income improvement

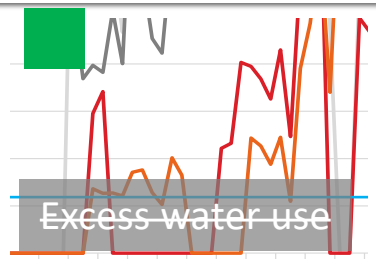
IFNA
Multisecral, nutrition improvement

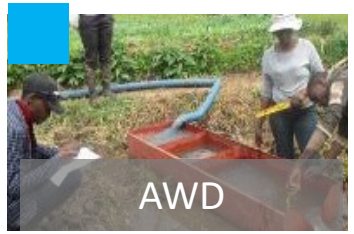
Rice varieties and cultivation techniques demonstrated in the project contribute to increased rice production and nutritional improvement in Africa

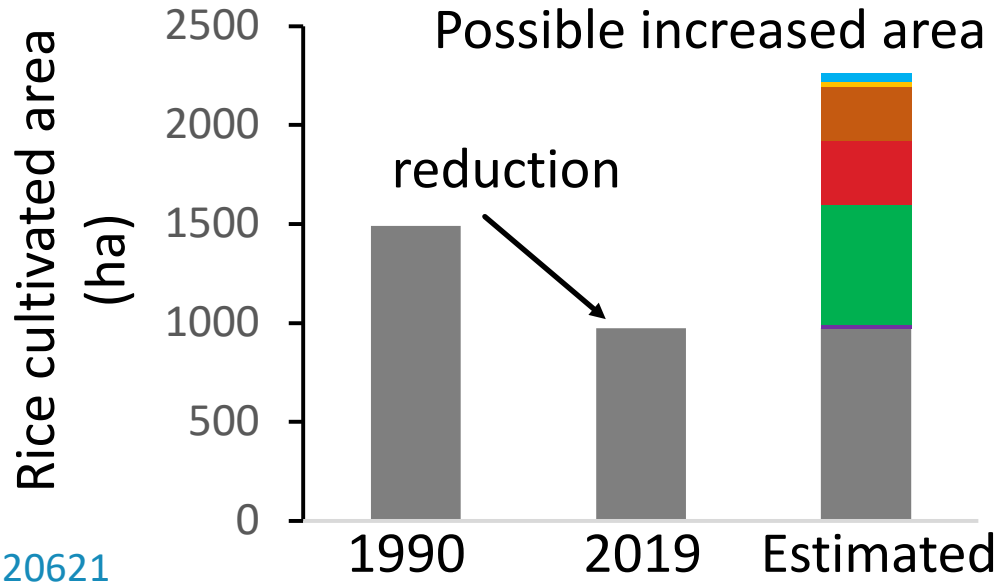
Coordination with higher-level goals and international efforts

Compiled a technical manual for more efficient water management in Lower Moshi irrigation scheme, Tanzania







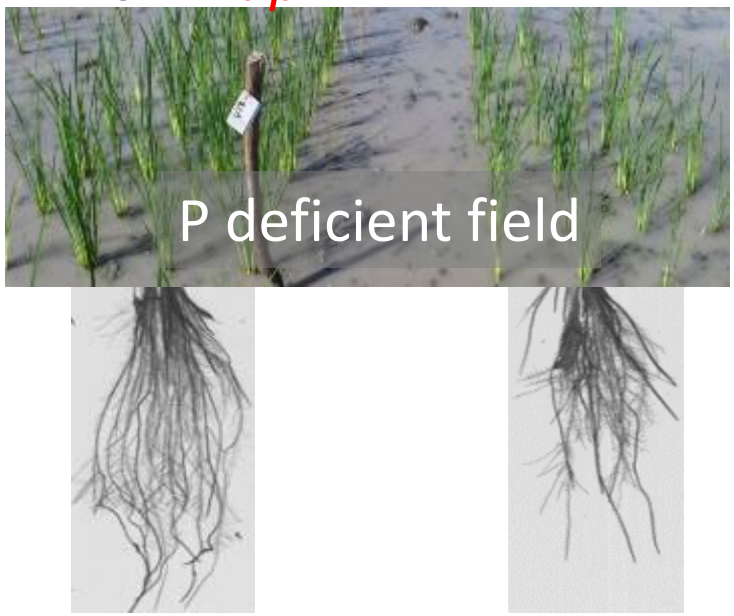


https://www.jircas.go.jp/en/reports/2022/r20220621

Released 2 new lowland rice varieties, FyVary32, 85 with high yields on poot nutrient conditions in Madagascar

1990s: Finding of Pup1 locus (from traditional *aus* variety)
2012: Gene and functional mechanism identified (*Nature*)

IR64+*Pup1* IR64



✈ 2015-2019: Repeated selection & generation adv. In Madagascar

2020-2021: Prod. & taste tests

	Production test (n=18)		Taste test (score 1-5) (n=412)		
	Yield	Days to flower	Appare nce	Flavour	Texture
FyVary32	+12%	-5	3.8	3.7	3.7
FyVary85	+20%	+4	3.8	3.8	3.8
X265	-	-	3.7	3.9	3.9

In collaboration with IRRI

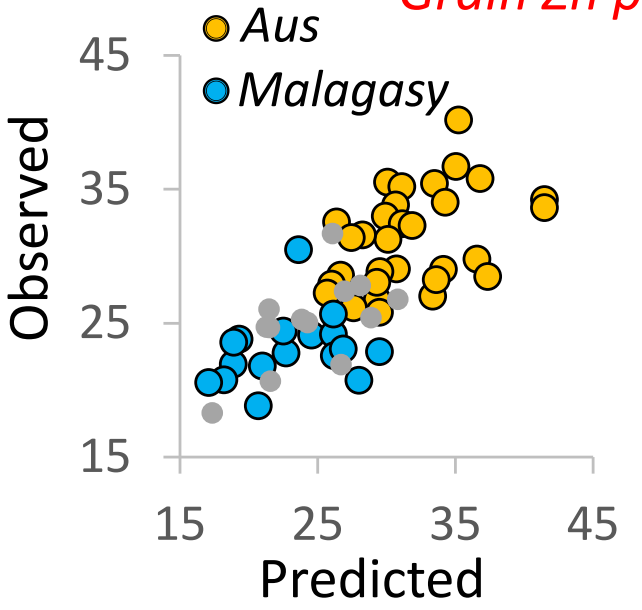
Genomic prediction model and a promising donor for Zn biofortification in rice breeding

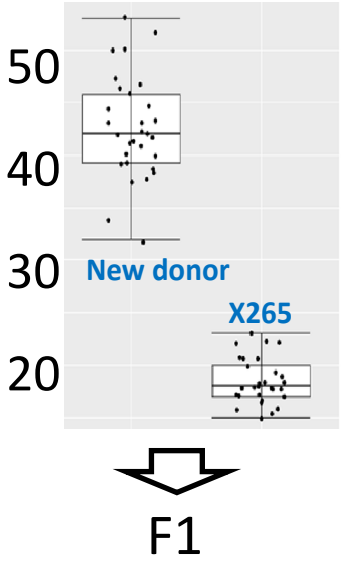
IRRI 3K accession with genome data

+

Prediction model

Grain Zn ppm

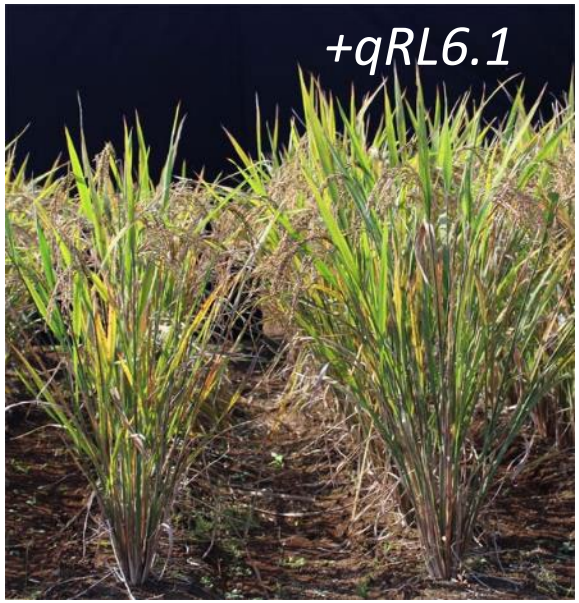




In collaboration with CIRAD, HarvestPlus

Development of near-isogenic lines (NILs) of QTL for root elongation or qRL6.1 in major rice varieties in SSA

- Confirmed higher yields of NILs in upland & lowland conditions.
- Started field evaluations of NILs (Nerica1, 4, L-19) in Guinea where these parent varieties are widely cultivated.

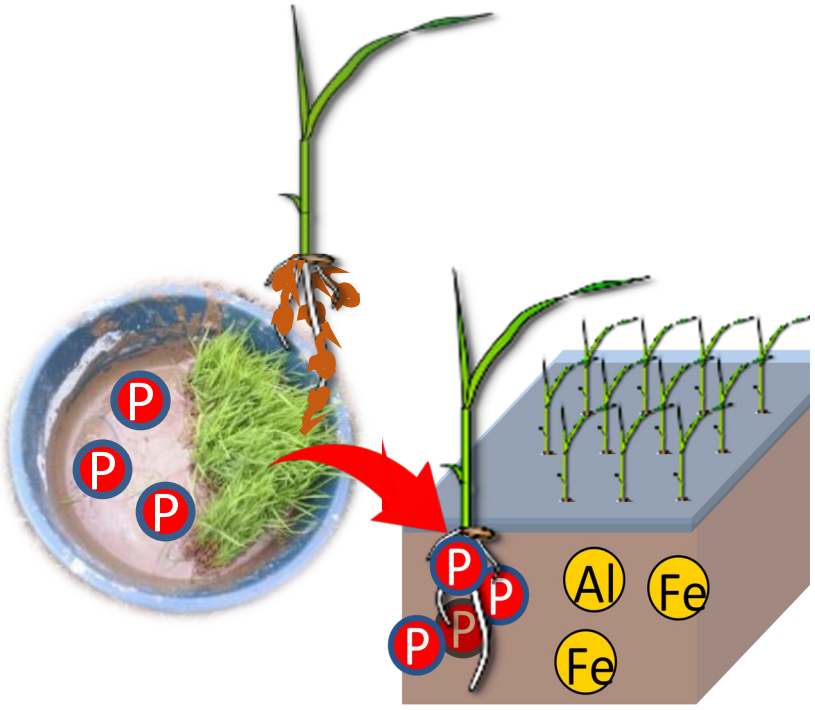


	Upland		Lowland	
	NERICA1	NERICA4	NERICA L-19	Sahel 108
Yield of original (t/ha)	1.4	2.3	7.8	8.7
Yield of NIL (t/ha)	2.1	2.8	9.3	10.6
Yield advantage	+55%	+22%	+19%	+22%

Results at JIRCAS in Japan and AfricaRice in Senegal

Development of P-dipping to increase rice yields with low fertilizer use and to improve stress resistance

- P-dipping also improves resistance to climate-induced stresses.



Pilot-test (300 farmers' fields) showed x2 fertilizer use efficiency than broadcast

shortened nearly 1 month

Already matured!

Accelerate initial growth

extreme weather

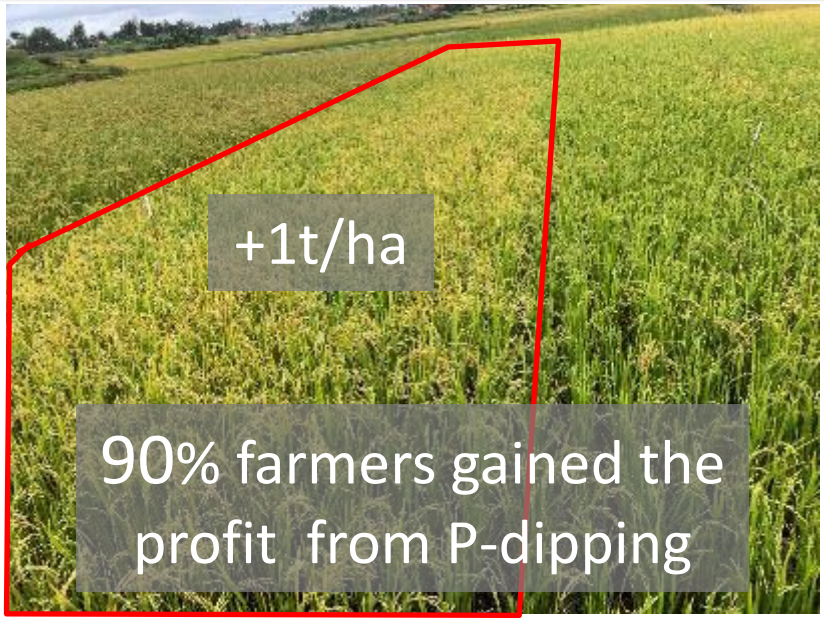
P-dipping disseminated to >3,000 farmers' fields in collaboration with JICA tech. coop. project, Malagasy government, and fertilizer company

Ministers', Governor's visits to the pilot-test site and promoted

Technical manual

Small fertilizer sac for P-dipping

disseminated to >3,000 farmers

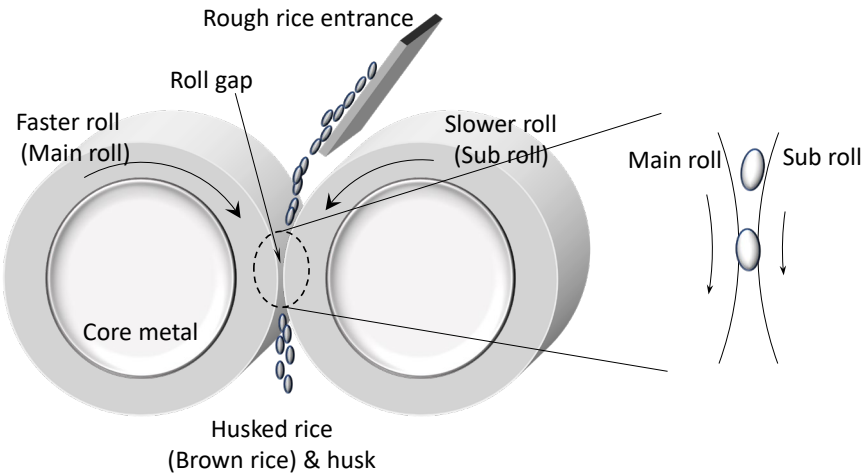


+1t/ha

90% farmers gained the profit from P-dipping

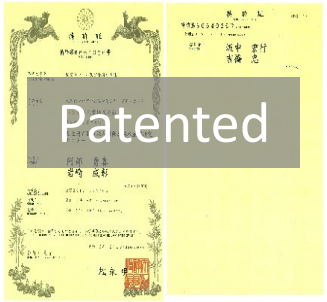
No one left behind

Re-designed a polyurethane-based husker roll for long-grain rice with longer durability & higher husking quality



BANDO JIRCAS 国際農研

PPP with the leading company on husker roll and belts to prepare improved roll for long grain



Roll husker, used in commercial milling plants had little improvements since 1920s

⬇ *identified*

Long-grain rice husking has higher broken rice ratio and shorter durability of the rolls due to the friction loss on the roll surface

⬇ *Re-designed*

10 times durability (240hrs) + higher husking & less broken rice ratio!

⬇ *Patented in JPN, US, EU, CHN*

Available in market soon

Identified the quantitative impact of rice yield on human nutrition (energy, VitA, Zn, Fe) in Madagascar

Lowland rice yield +1t/ha

Rice Prod. *up*

Rice Cons. *up*

Intake of Calory +9%

Rice sales *up* +65,000Ar/AE

Income *up*

ns.

Other food prod.

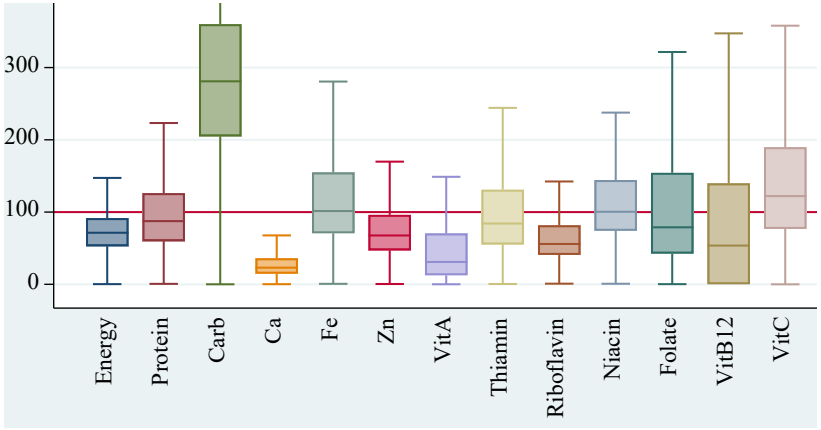
Veg. Cons. *up* +3,600Ar/AE/y

Fruit Cons. *up* +4,560Ar/AE/y

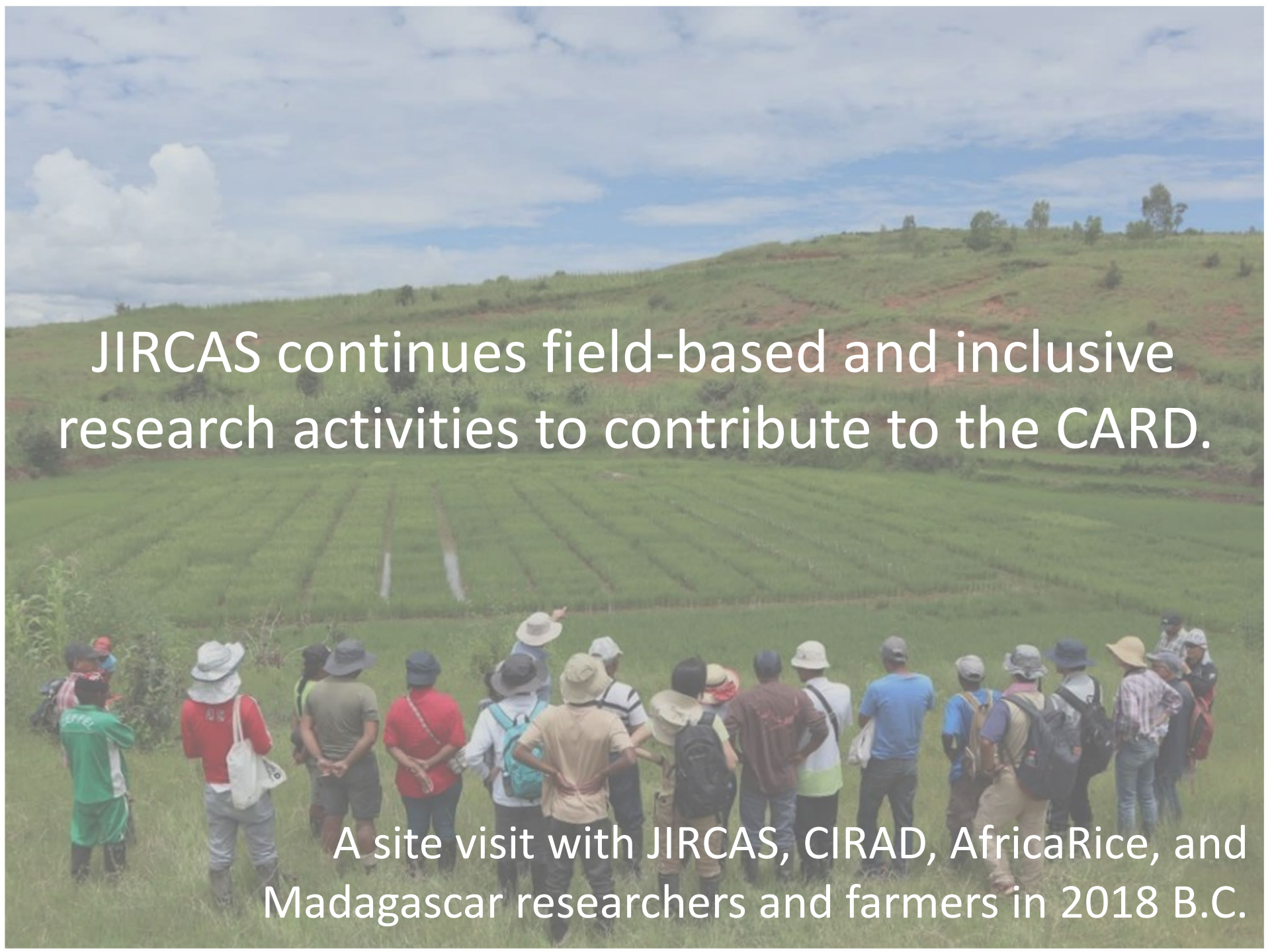
Meat/fish. Cons. *up* +5,160Ar/AE/y

VitA +6%
Zn +3%
Iron +22%

Current nutrition status



Based-on 600 household surveys for 12 seasons in 2018-2022 in the central highlands of Madagascar


JIRCAS continues field-based and inclusive research activities to contribute to the CARD.
A site visit with JIRCAS, CIRAD, AfricaRice, and Madagascar researchers and farmers in 2018 B.C.