JIRCAS

Japan International Research Center for Agricultural Sciences

Benefitting from Networking: Alignment of national research and international research priorities

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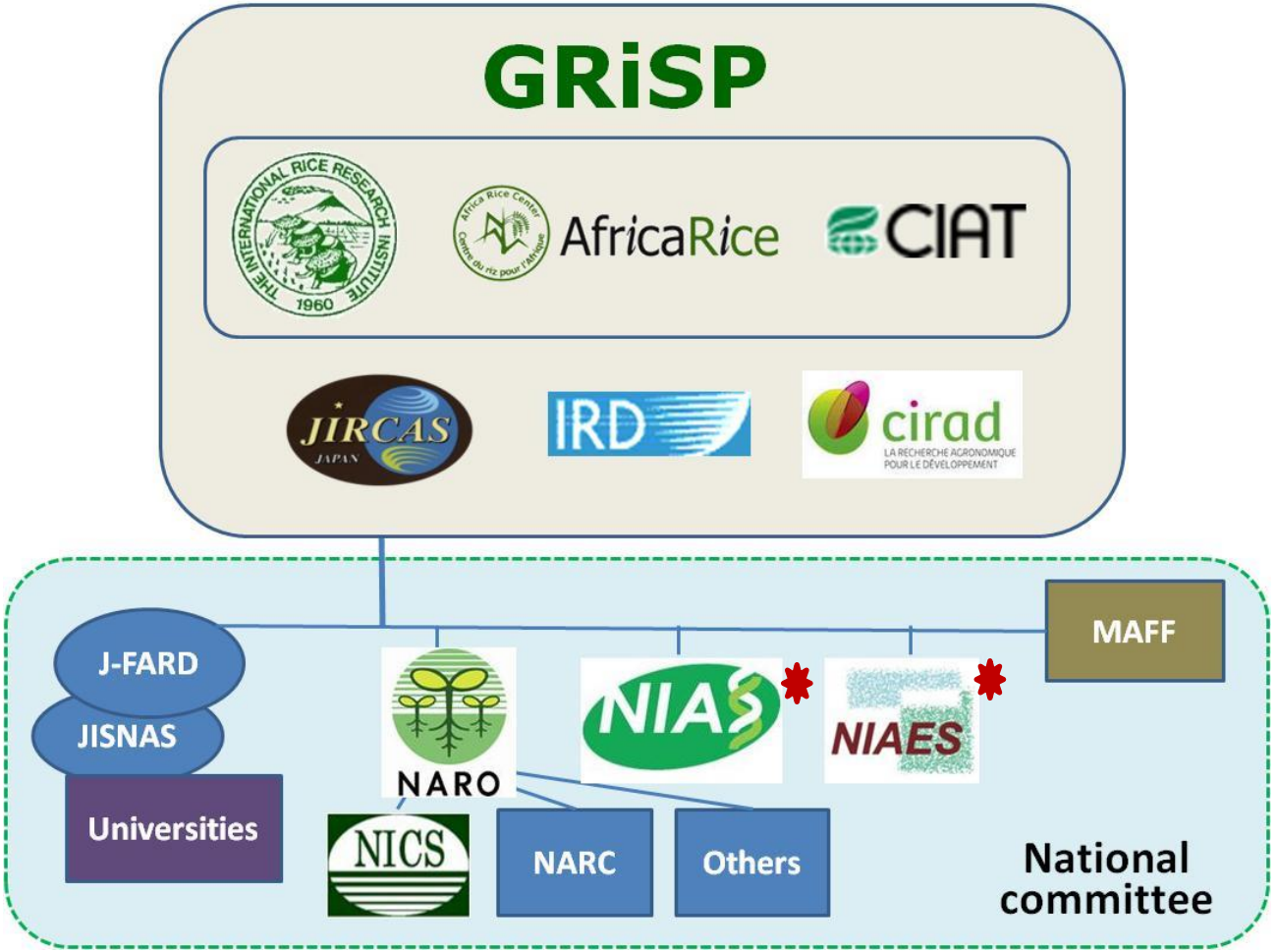
Outline

- Background
  - Location specificity of agriculture research
  - Global issues needs global solutions
  - Linking national research with international research
- Alignment with Global Rice Science Partnership (GRiSP)
  - How to make alignment?
  - Examples of research activities
  - Value of networking

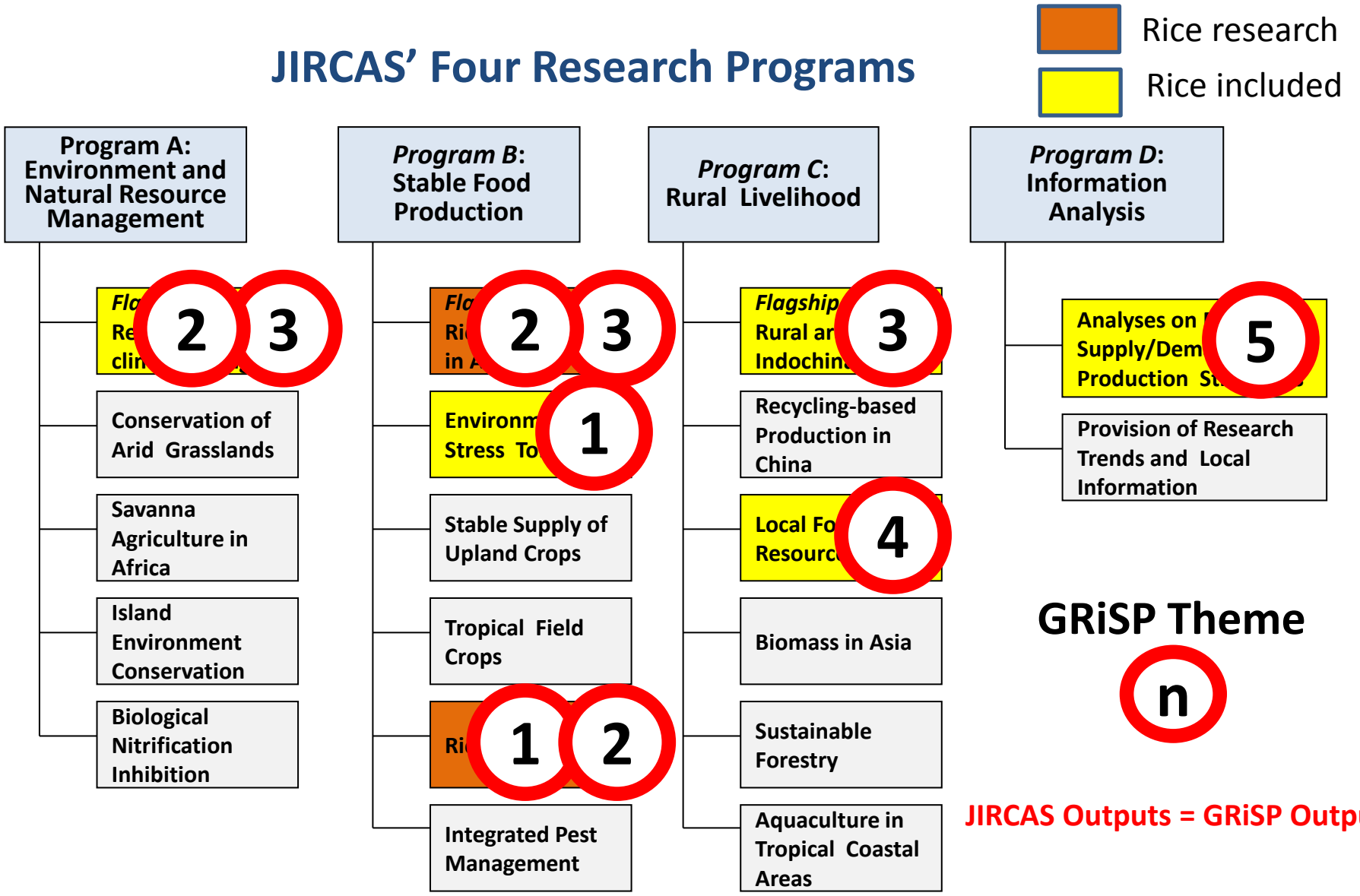
Alignment of national research agenda with global priority : An example from Global Rice Science Partnership alliance



GRiSP-Japan

✸ Merged under NARO in April 2016

Alignment exercise at JIRCAS with GRiSP



SPIKE increases rice grain yield: enhancement of yield-related traits

Panicle

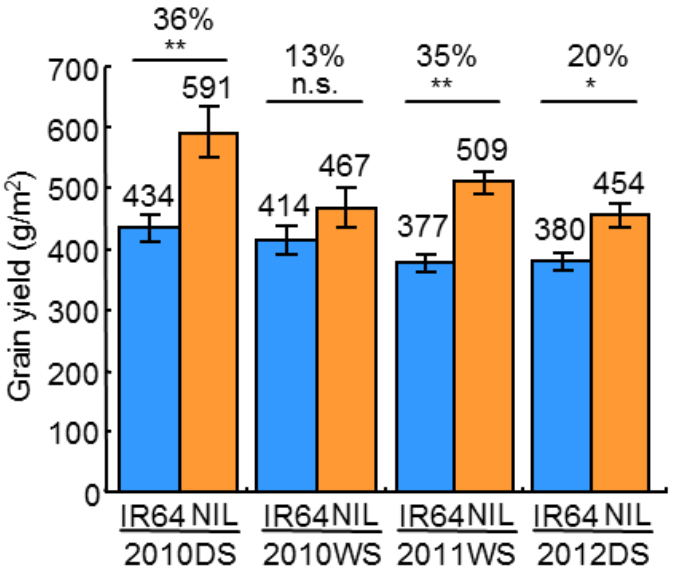
IR64 IR64+*SPIKE*

Leaf

IR64 IR64+*SPIKE*

Root

IR64 IR64+*SPIKE*

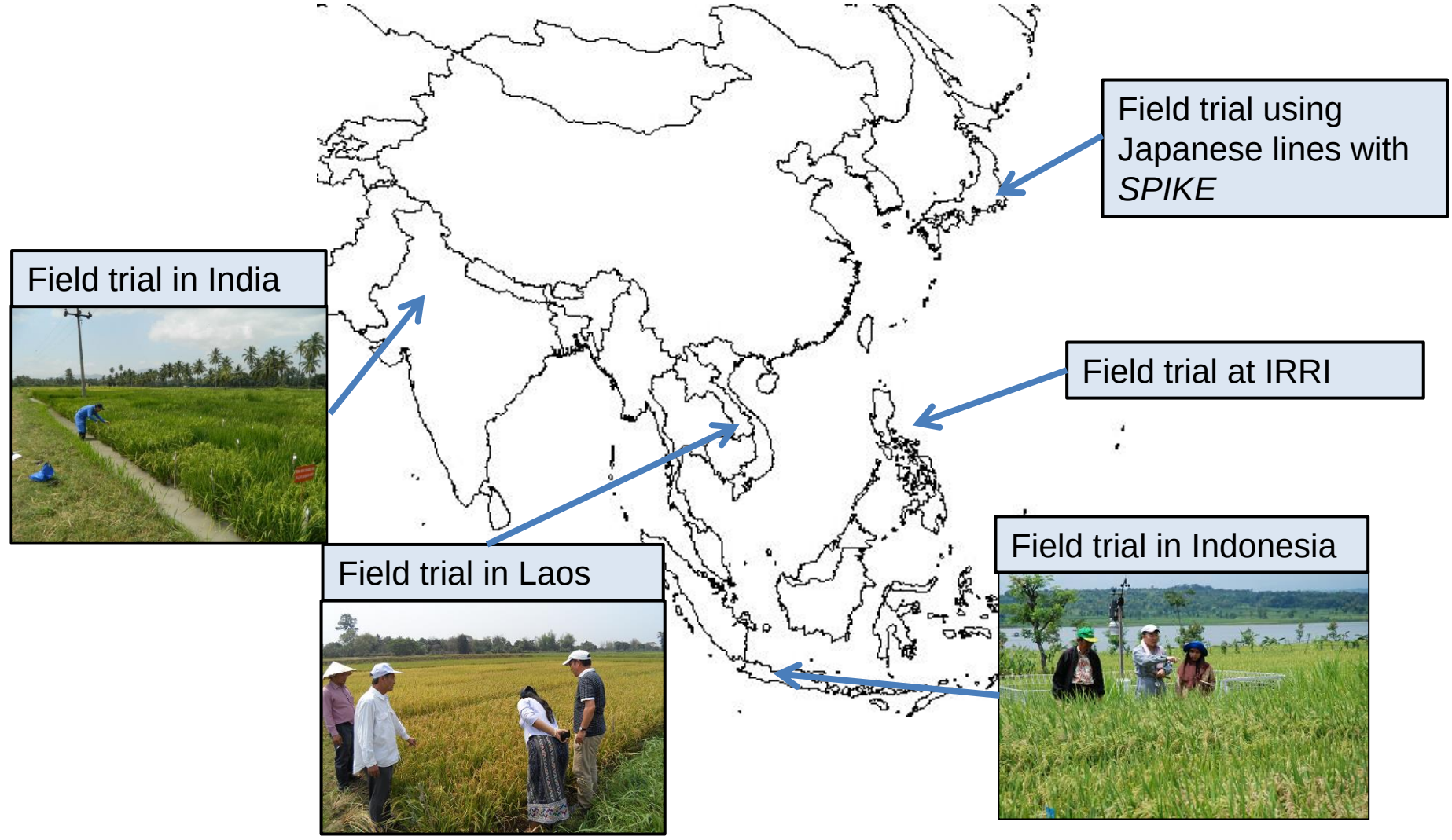


NIL: IR64+*SPIKE (yield trials at IRRI)*

Increased photosynthesis, root growth, translocation and sink capability

Fujita et al. *PNAS* (2013)

Multi-environment testing with *SPIKE*



Further collaboration in Africa and Latin America (with AfricaRice and CIAT)

Deeper rooting for drought tolerance
(discovery of *DRO1* gene)

IR64

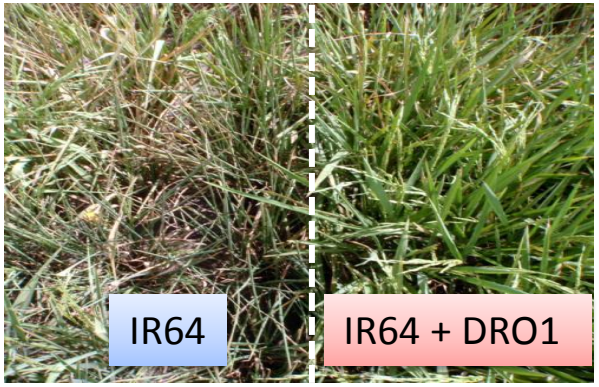
IR64 + DRO1

Kinandang Patong

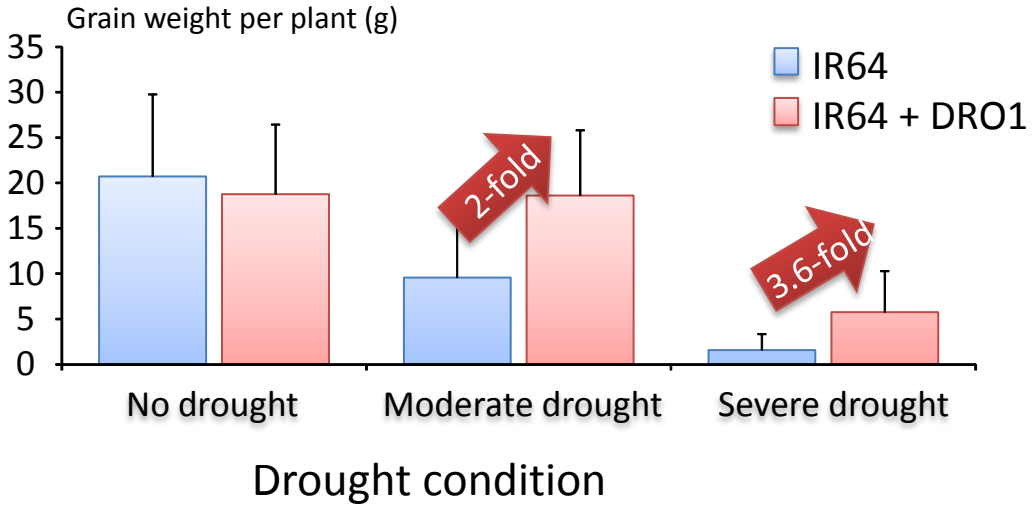
Upland rice cultivar from the Philippines

Provided by Dr. Uga, NARO

DRO1 conduces to high yield performance under several conditions of drought stress



Responses of IR64 and IR64+Dro1 to 27 days of severe drought condition



Collaborative project with GRiSP-CGIAR

IRRI
INTERNATIONAL RICE RESEARCH INSTITUTE

CIAT
International Center for Tropical Agriculture
Since 1967 / Science to cultivate change

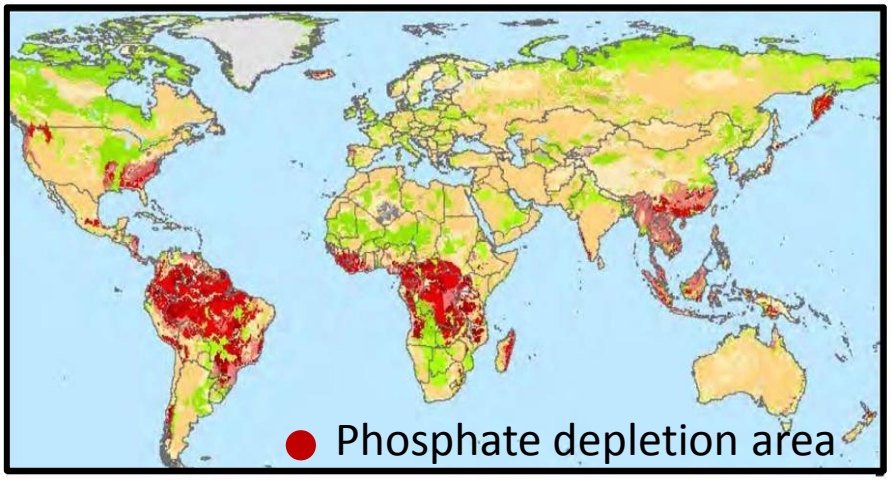
nature genetics

Control of root system architecture by *DEEPER ROOTING 1* increases rice yield under drought conditions

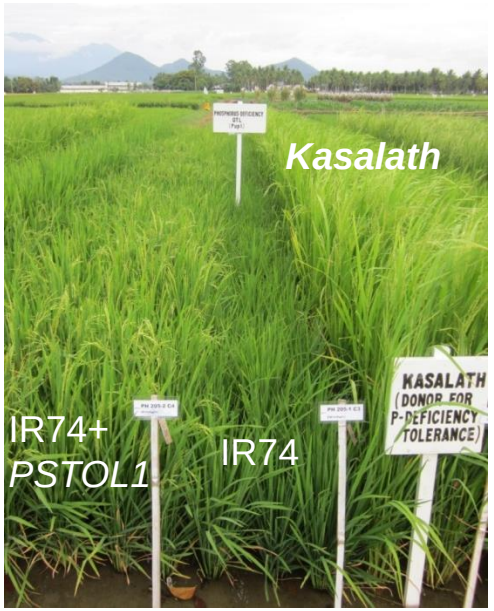
Yusaku Uga[1], Kazuhiko Sugimoto[1], Satoshi Ogawa[2,3], Jagadish Rane[2,6], Manabu Ishitani[2], Naho Hara[1], Yuka Kitomi[4,6], Yoshiaki Inukai[4], Kazuko Ono[1], Noriko Kanno[1], Haruhiko Inoue[1], Hinako Takehisa[1], Ritsuko Motoyama[1], Yoshiaki Nagamura[1], Jianzhong Wu[1], Takashi Matsumoto[1], Toshiyuki Takai[5], Kazutoshi Okuno[1,6] & Masahiro Yano[1]

Uga et al. *Nature Genetics* (2013)

Use of gene to enhance phosphate starvation tolerance



- Phosphate depletion is one of the major problems in food production in Africa, and Asia.
- Fertilizer price has been increasing.
- Technologies to increase the uptake of phosphorus in soil are required.

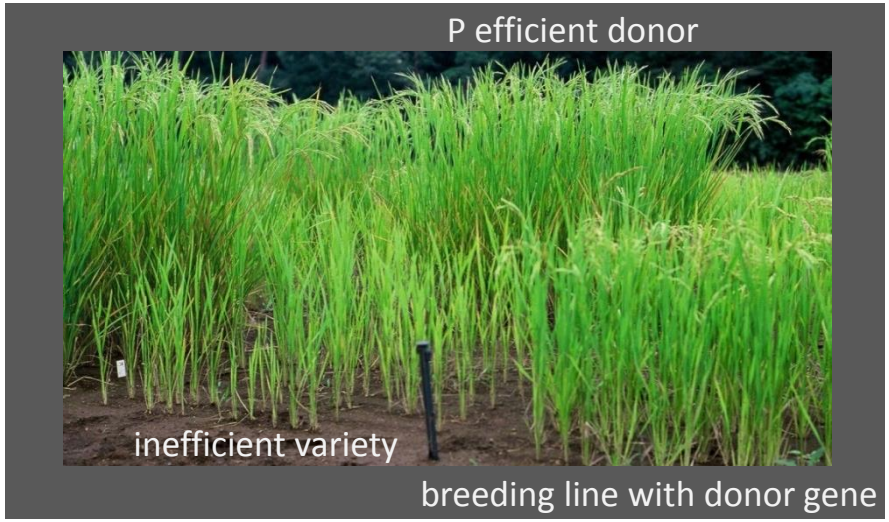


Field experiment of rice (IR74) with *PSTOL1* **[*IRRI, 2012*]**

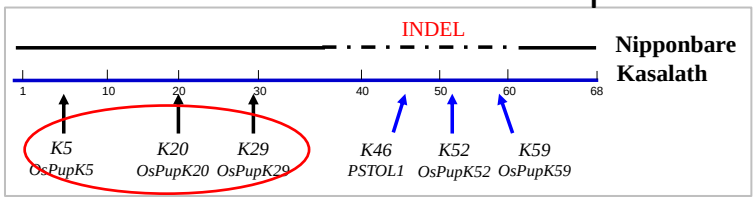
PSTOL1, a gene derived from Indian rice variety, *Kasalath,* can enhance phosphate starvation tolerance. Gamuyao et al. *Nature* (*2012*)

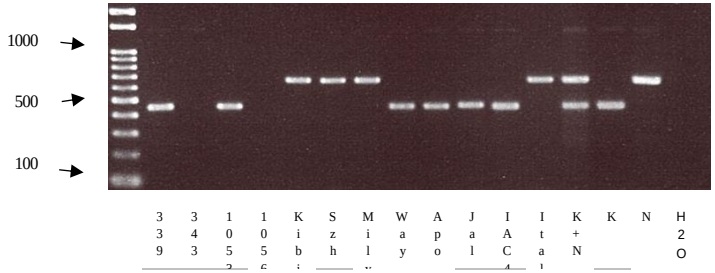
Phosphorus (P) efficiency breeding network

Screening germplasm collections to identify P efficient donors; identification of causal loci and genes



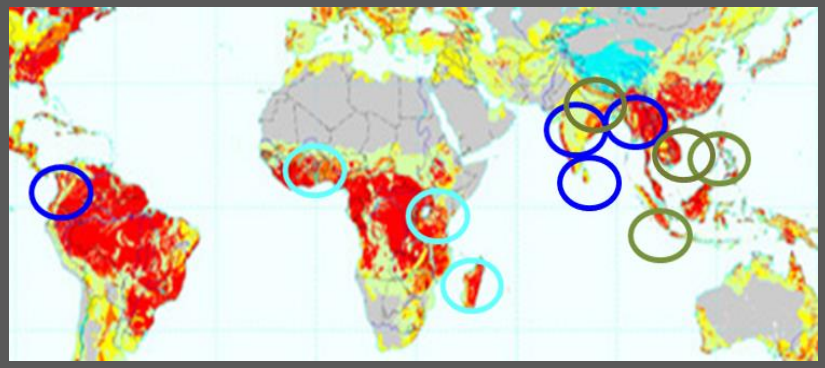
Pup1 locus





Markers are developed and shared with global partners to enhance their breeding research efficiency

Global partners in P efficiency breeding efforts



<u>Target</u>: Varieties with improved yield at reduced or low P fertilizer application

in red: P problem soils

Value of networking

- Complimentary strengths among partners
- G x E x M: efficient evaluation
- Efficient deployment of new knowledge and materials
- Upgrading of Japanese national research to international standard
- Triggering of global innovations benefitting both national and international research

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Thank you!