Resilience Breeding for Food Security

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ROTHAMSTED RESEARCH

BBSRC
bioscience for the future

Favorable versus unfavorable production systems

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Irrigated - favorable

- **~60%** of total rice area Asia (80 M ha*)
- **~ 70%** of rice production
- constant water control
- high fertilizer inputs
- weed control (by flooding and herbicides)
- favorable conditions

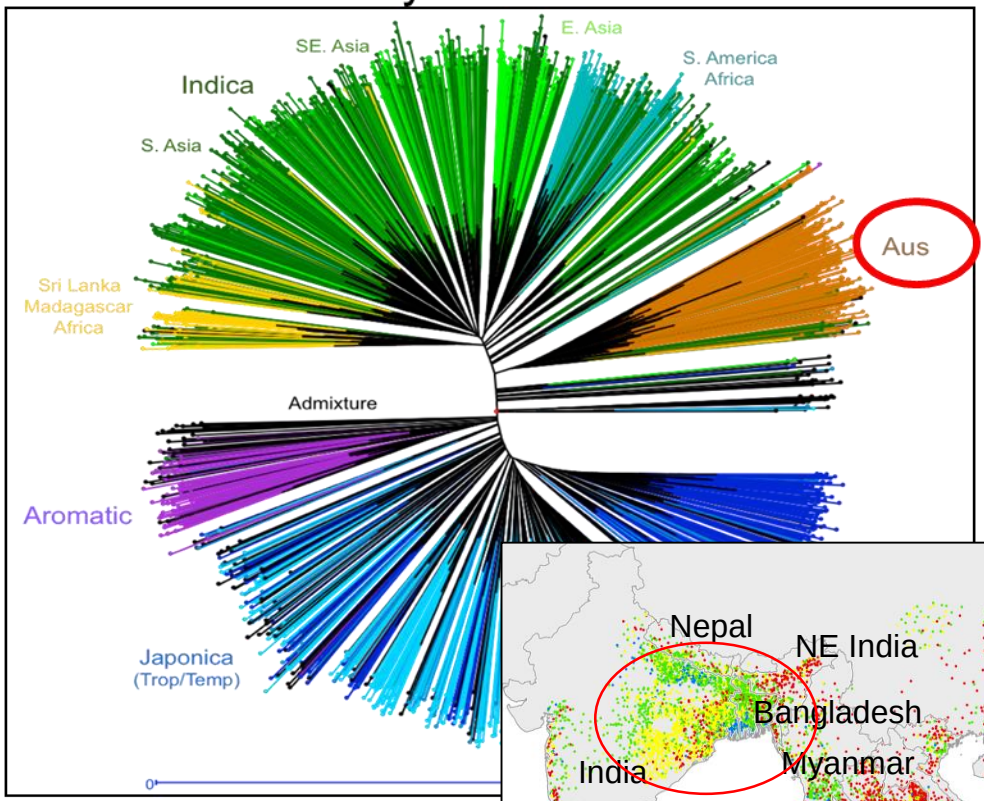
Rainfed – stress prone

- **~40%** of total rice area Asia (60 M ha*)
- **~ 25%** of rice production
- no or little water control
- low to very low fertilizer inputs
- weed control difficult and labor intensive
- Often unfavorable conditions

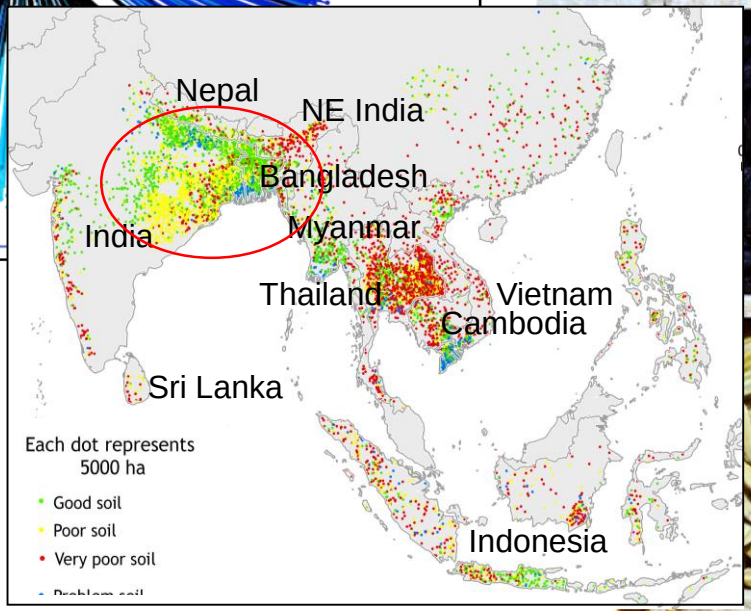
*Dawe et al 2010

Exploring genetic diversity for stress tolerance genes

SNP marker survey



Ken McNally et al, IRRI/GCP



Adapted from Haefele and Hijmans 2009

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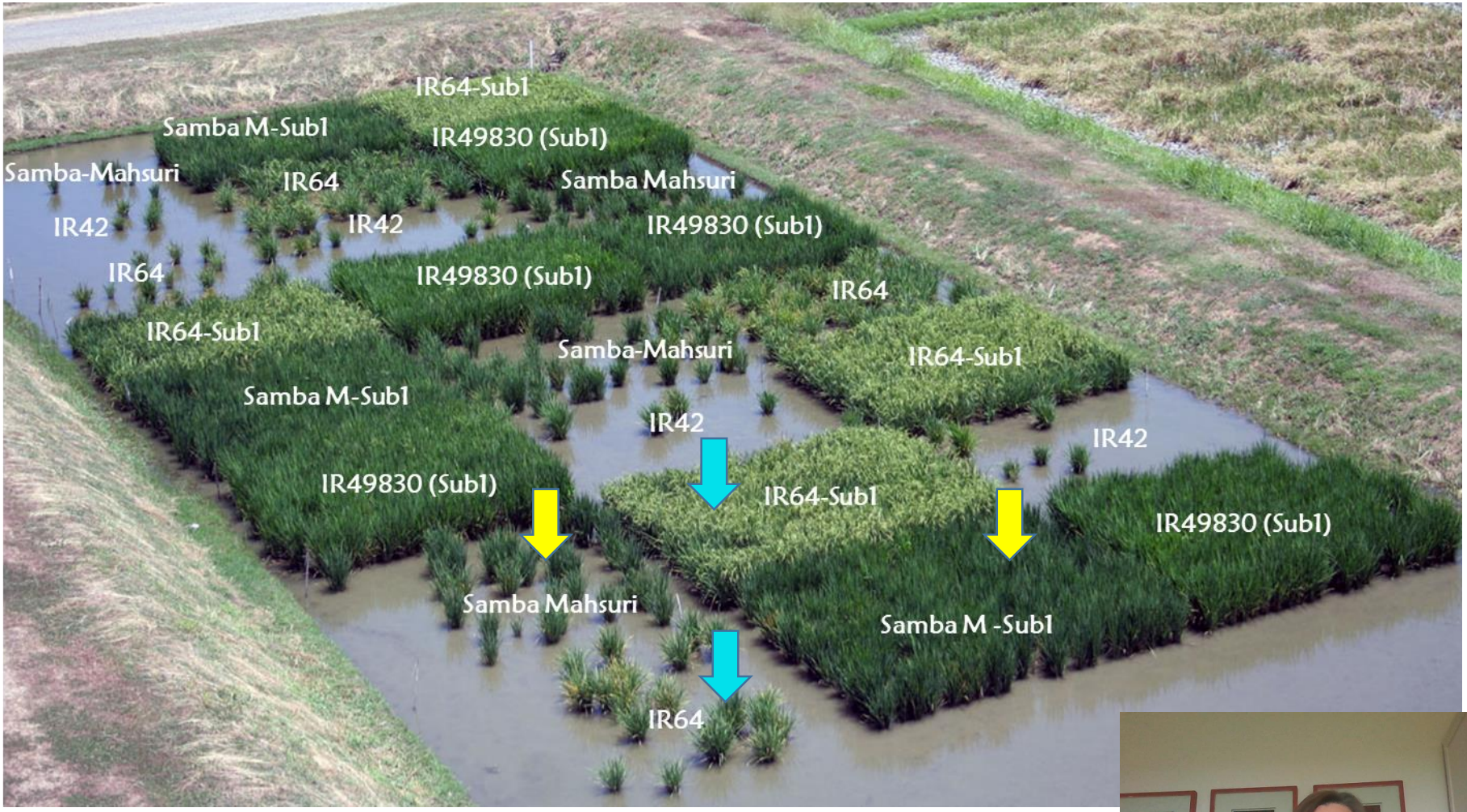
SUB1A - a single gene confers submergence tolerance



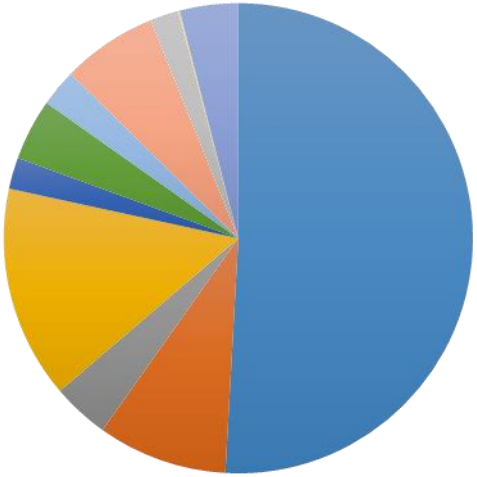
Recovery of Sub1 rice varieties after 17 days co

IRRI
INTERNATIONAL RICE RESEARCH INSTITUTE

Wheat diversity panel (Uni Adelaide, Australia)

A Triticeae panel of 1018 accessions – including ~570 bread wheat accessions

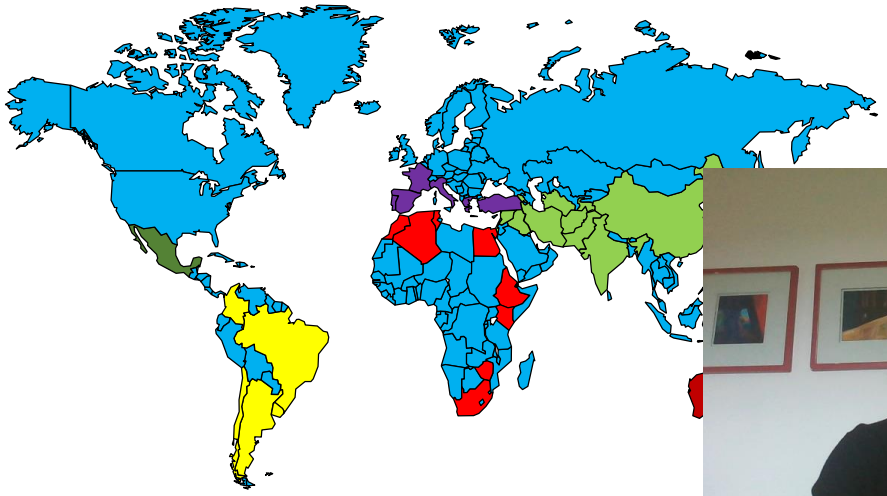
- *T. aestivum varieties*
- *T. aestivum landraces*
- *Synthetic T. aestivum*
- *T. turgidum durum*
- *T. urartu*
- *T. monococcum*
- *T. boeticum*
- *T. turgidum dicoccum*
- *T. turgidum dicoccoides*
- *Triticale*

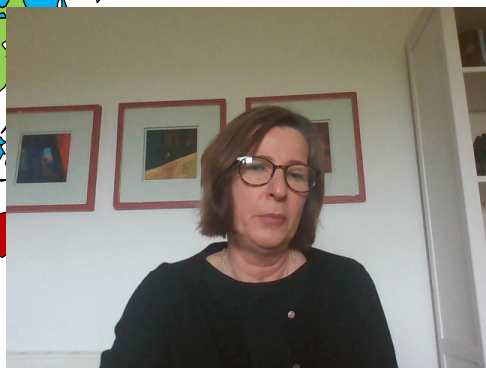


NAM population

75 donors x 2 Australian wheat (Gladius, Scout)

- imported into the UK
- phenotyping for H&D in India and other places





Designing Future Wheat (DFW):
A multi-institute consortium 2017-2022

- **Framework for the synergistic integration of BBSRC-funded ISP wheat activities**

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Earlham Institute

John Innes Centre

NIAB

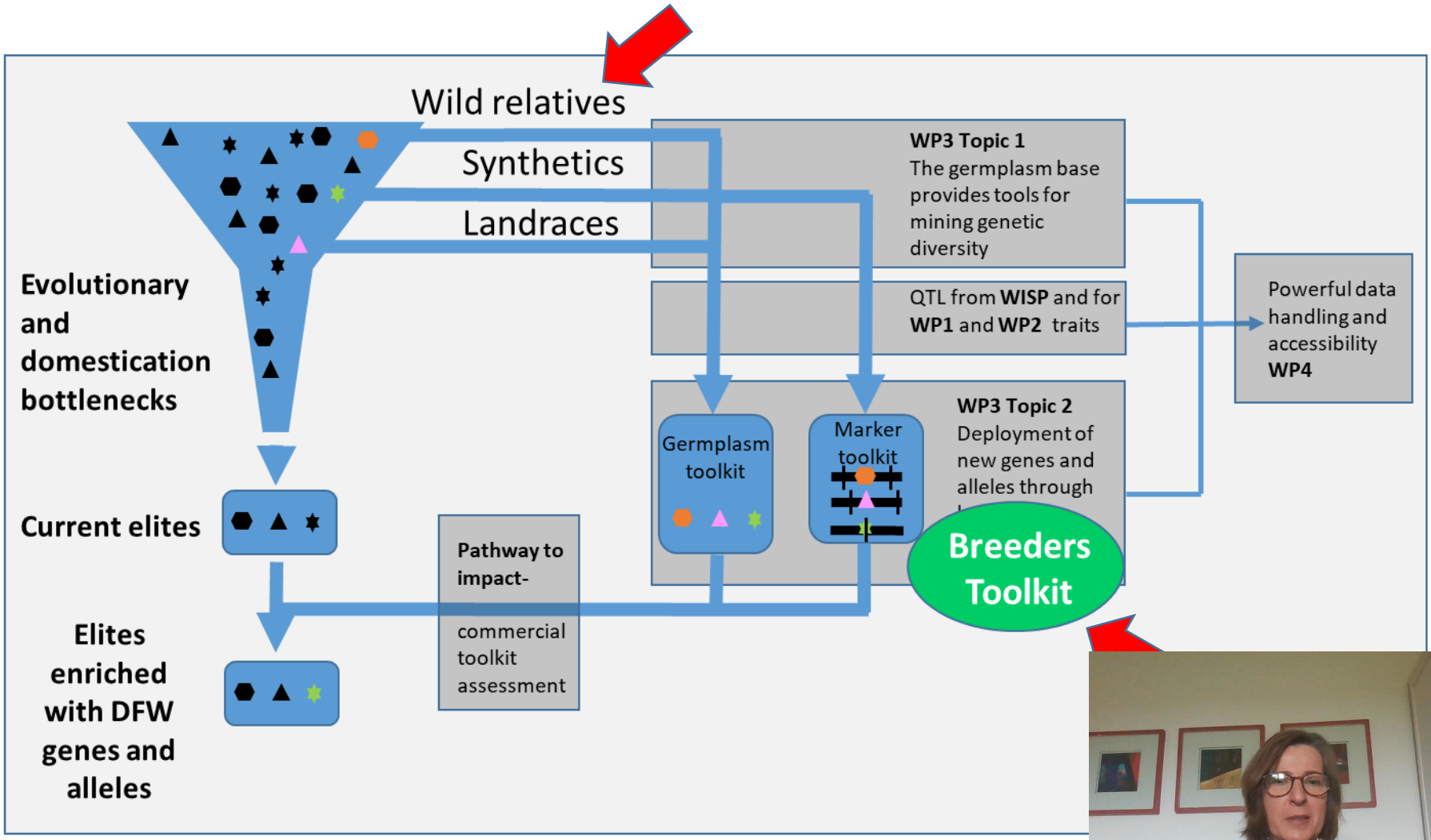
University of BRISTOL

The University of Nottingham
UNITED KINGDOM · CHINA · MALAYSIA

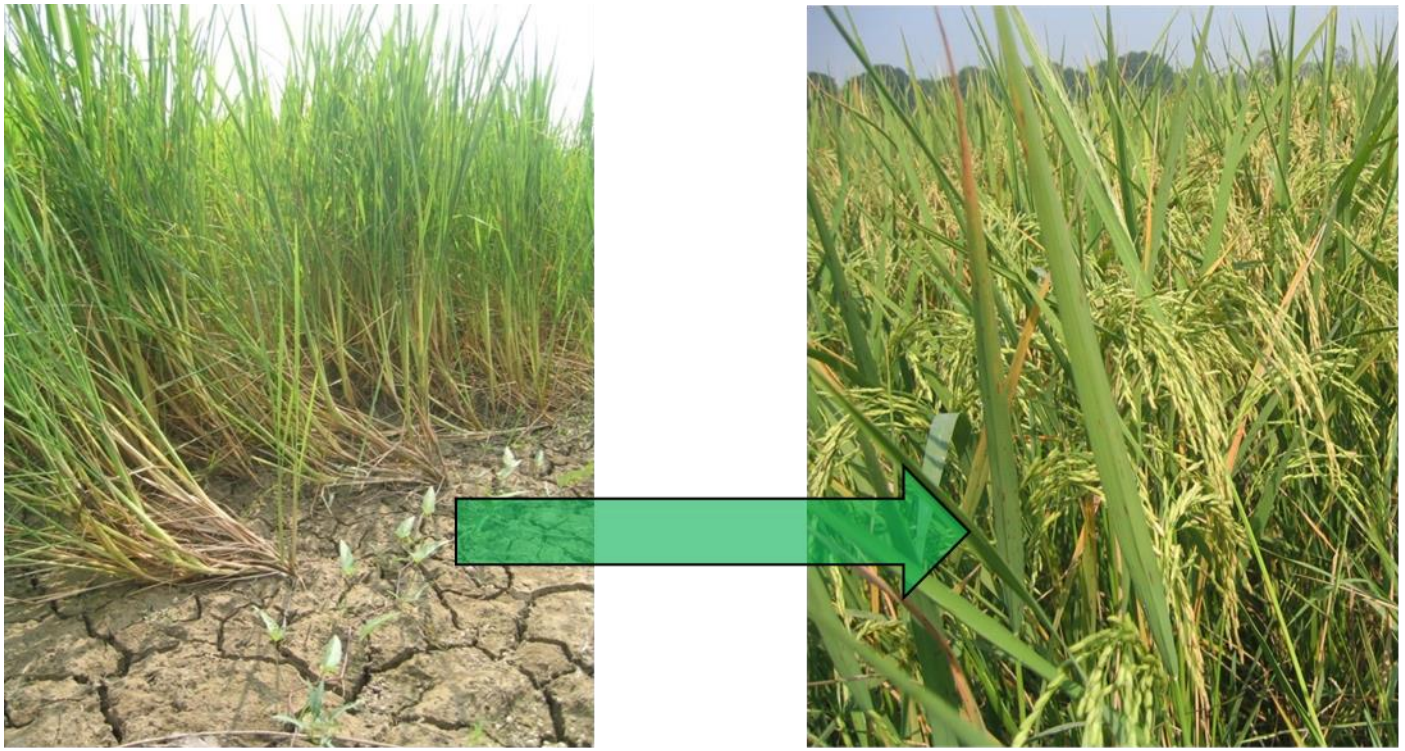
EMBL

IFR Institute of Food Research

Overcoming the Domestication Bottle Neck – DFW germplasm pipeline



Landraces have valuable genes - but are low yielding



Transfer trait of interest - restore desirable pl
(forward genetics, molecular breeding)

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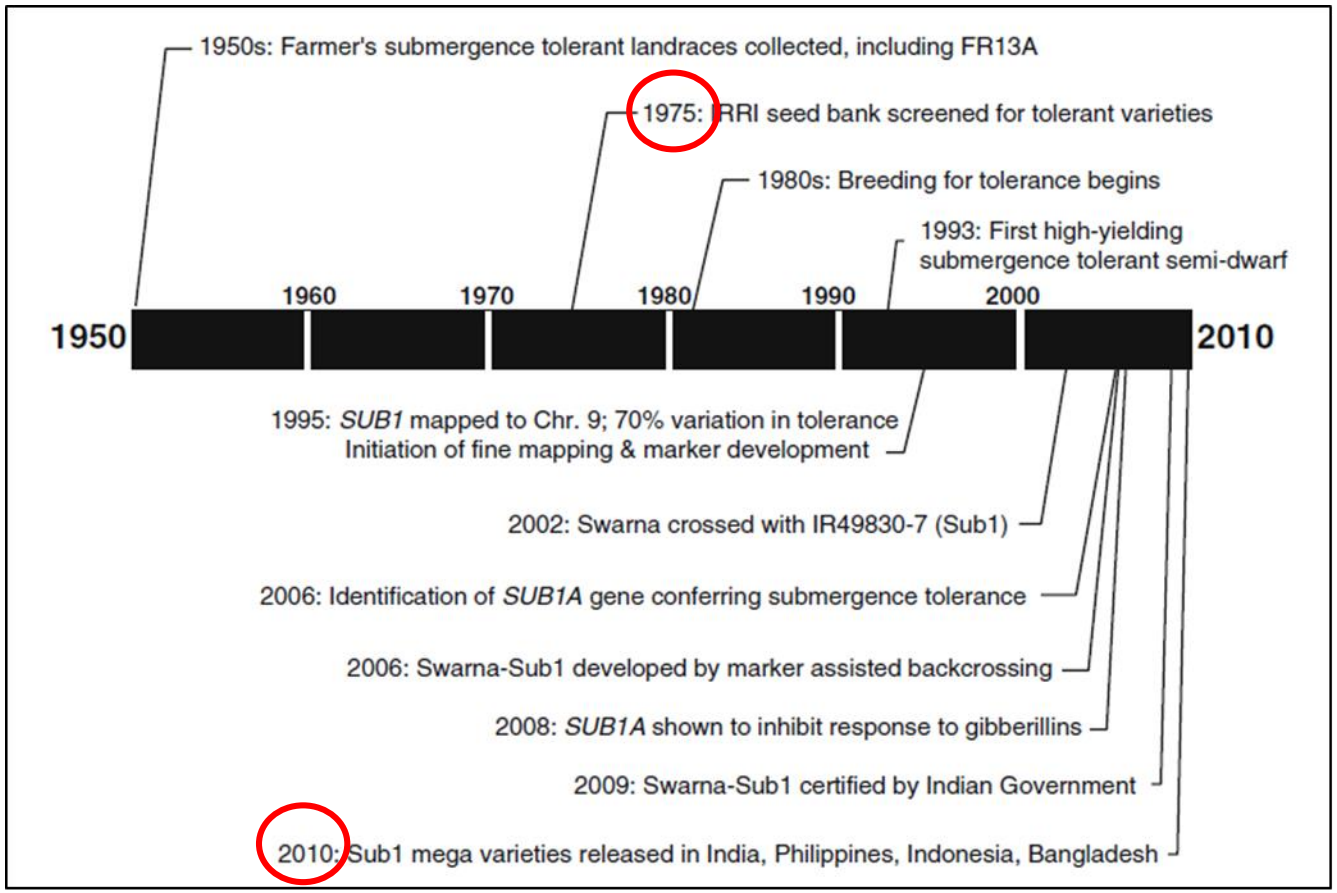
A very long journey to success



IRRI
International Rice Research Institute

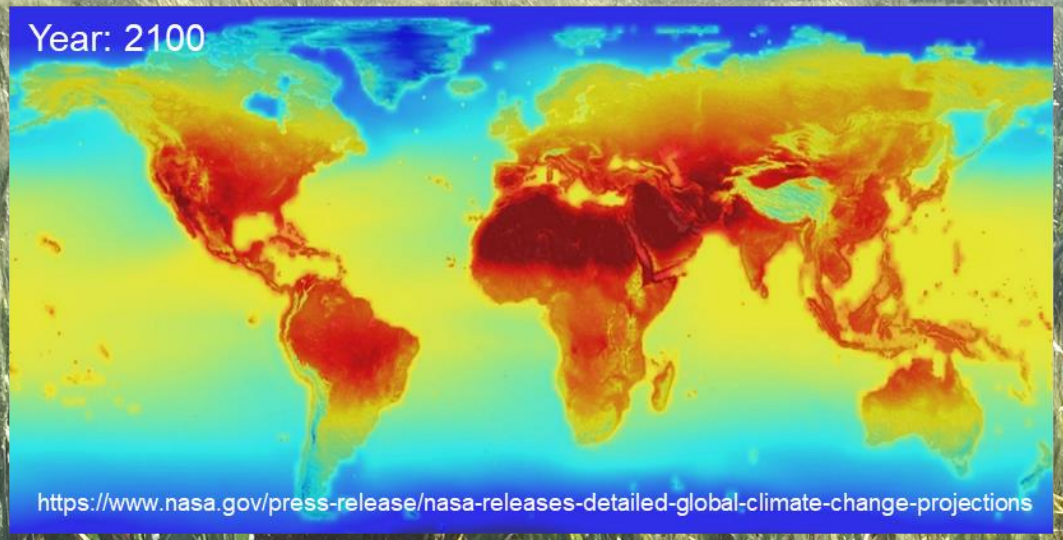
35 years !

Bailey-Serres et al 2010 Rice DOI 10.1007/s12284-010-9048-5

We have to do better than that – c

Genetic diversity programs for food security

Look into the future & invest in breeding and research today



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