2015 Asia Sub-Group Meeting of GRA-PRRG
18 September 2015
ISS-CAS, Nanjing, China

Pilot Multi-Site/Country Experiment

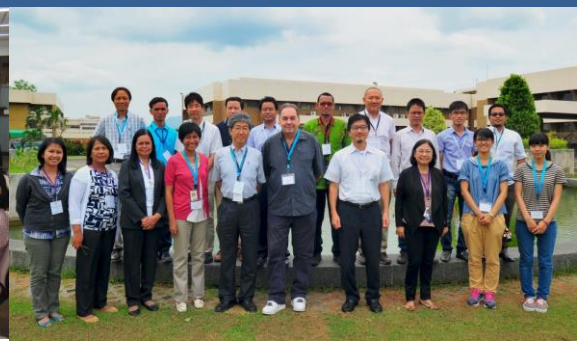
Kazunori Minamikawa (NIAES)

Agnes Padre (IRRI)

And other participants

MIRSA Project

(Greenhouse Gas Mitigation in Irrigated Rice Paddies in Southeast Asia)



JGSEE/KMUTT

Hue Univ. A&F

PhilRice

IRRI

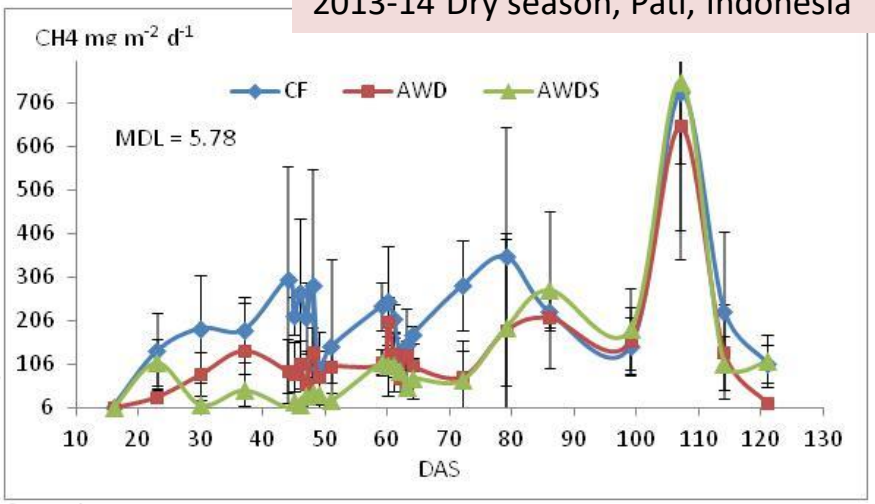
Coordinated by

NIAES

MIRSA

IAERI

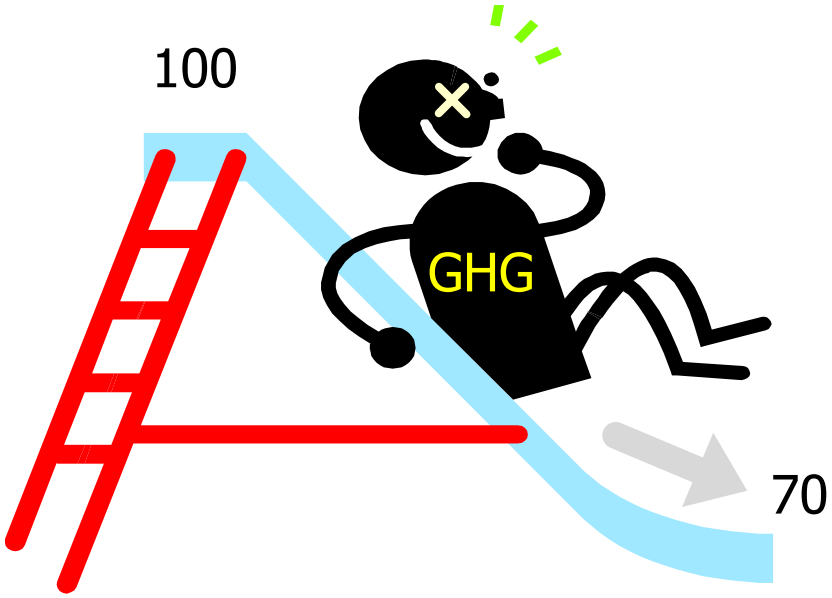
2013-14 Dry season, Pati, Indonesia



- A research project funded by MAFF, Japan, from 2013 to 2018
- Aiming at assessing the feasibility of GHG mitigation through water saving techniques (AWD) in irrigated rice fields
- Results shows effectiveness of AWD to reduce CH_4+N_2O emissions

Research objective

Our project aims to develop improved water management based on Alternate Wetting and Drying (AWD) that can always reduce soil-derived CO_2-eq emission (CH_4 + N_2O) during rice growing season from irrigated rice paddies in Asian countries by 30% compared to the conventional practice.

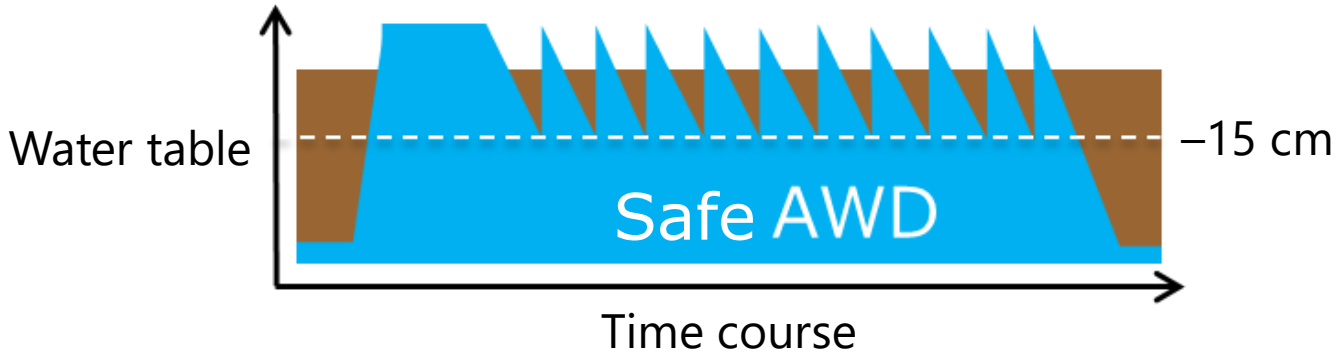


AWD: Alternate Wetting and Drying

As far as I know, the term "AWD" is now used as a common term that denotes "water management practice during rice growing period."

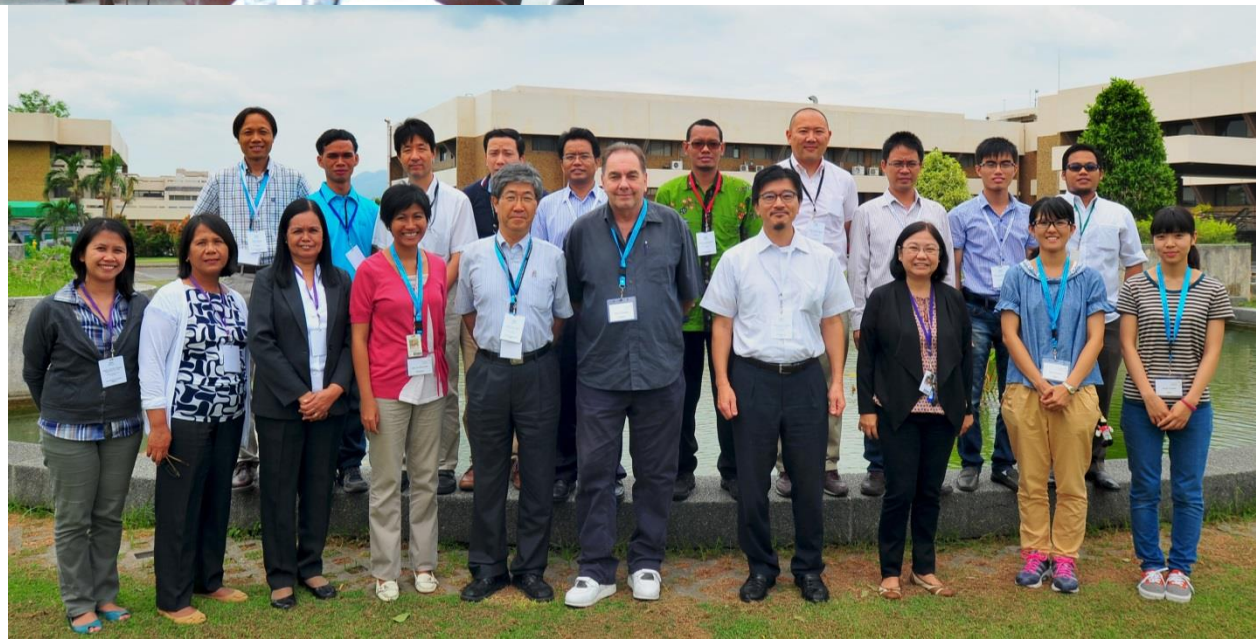
In our project, the three practices are shared and tested at all the sites.

1. **Continuous flooding**: as reference practice
2. **Safe AWD**: naturally drained until the surface water table reaches –15 cm; and then irrigated…
3. **Site-specific AWD**: established based on scientific experience of each monitoring site (i.e., can differ in the practice among the sites)



Previous annual meetings

Kick-off meeting
2-4. Oct. 2013
Hue University of Agriculture and Forestry, Vietnam



2nd annual meeting
18-19. Aug. 2014
IRRI, Philippines

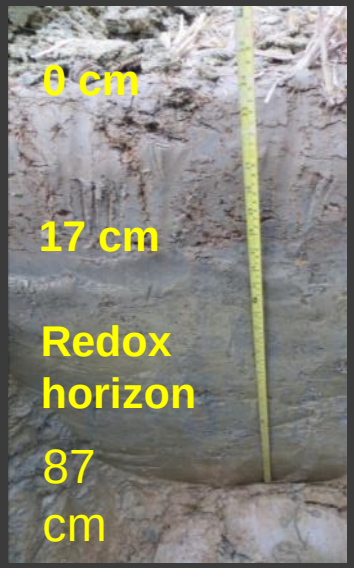
Previous site visiting

NIAES and IRRI colleagues have inspected all the four sites.

Soil Profiles

VIETNAM

Thua Thuen, Hue



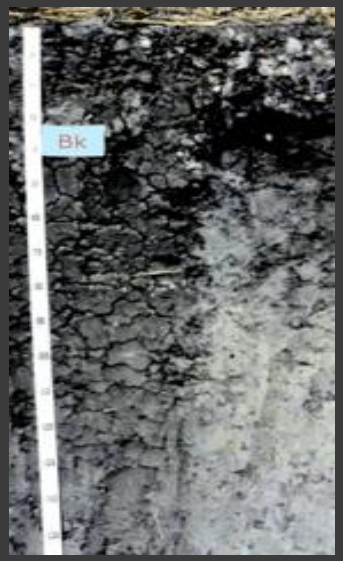
FAO: Dystric Fluvisols, USDA: Typic Endoaquepts

WET

no mottles

THAILAND

Bansang, Prachinburi



USDA: Vertic Endoaquepts

WET

with mottles

INDONESIA

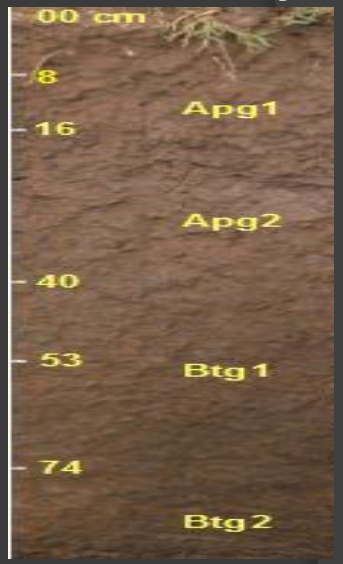
Jakenan, Pati, Central Java

USDA: Aeric Endoaquepts

DRY

PHILIPPINES

Maligaya, Muñoz, Nueva Ecija



FAO: Ustic Epiaquert
USDA: Eutric Vertisol

DRY

Decreasing condition

Indicates seasonal oxidation in the soil pores

Greenhouse Mitigation in Irrigated Rice Systems in Southeast Asia

Site Specificities

Soil

	HUAF	IAERI	PhilRice	PRRC
Site	Thua Thien, Hue	Pati, Central Java	Muñoz, Nueva Ecija	Bansang, Prachinburi
Soil texture	loam	Loam	Clay	Clay
Clay	17.5	18.2	17	10.4
Silt	33.2	34.9	39	26.7
Sand	49.3	46.9	44	62.9
pH	4.18	6.24	6.44	4.93
Total C %	1.25	1.37	1.72	1.93
Total N %	0.068	0.08	0.101	0.18


Indonesia


Thailand


Philippines

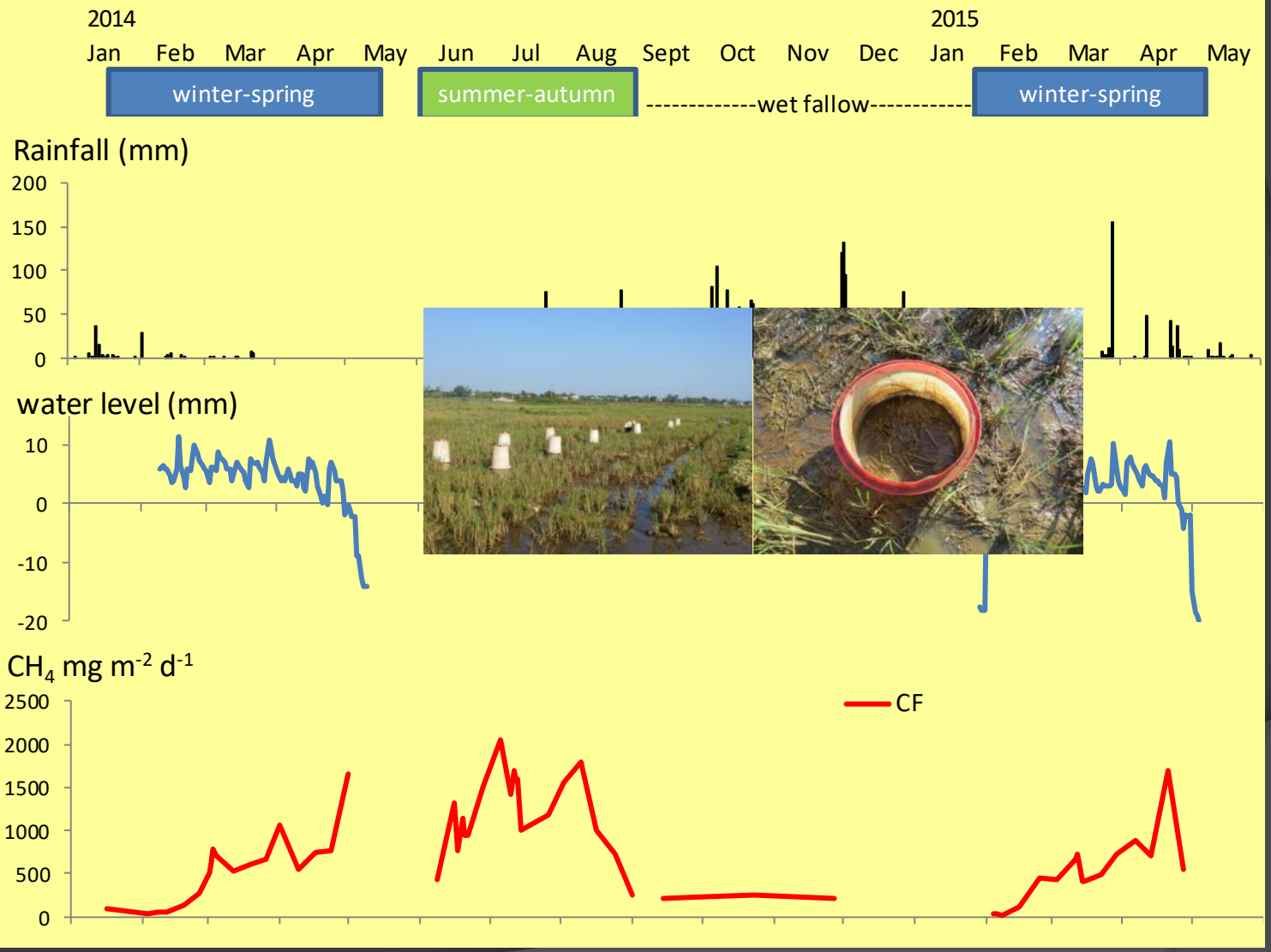

Vietnam

3rd Annual Meeting of MIRSA-2 Project

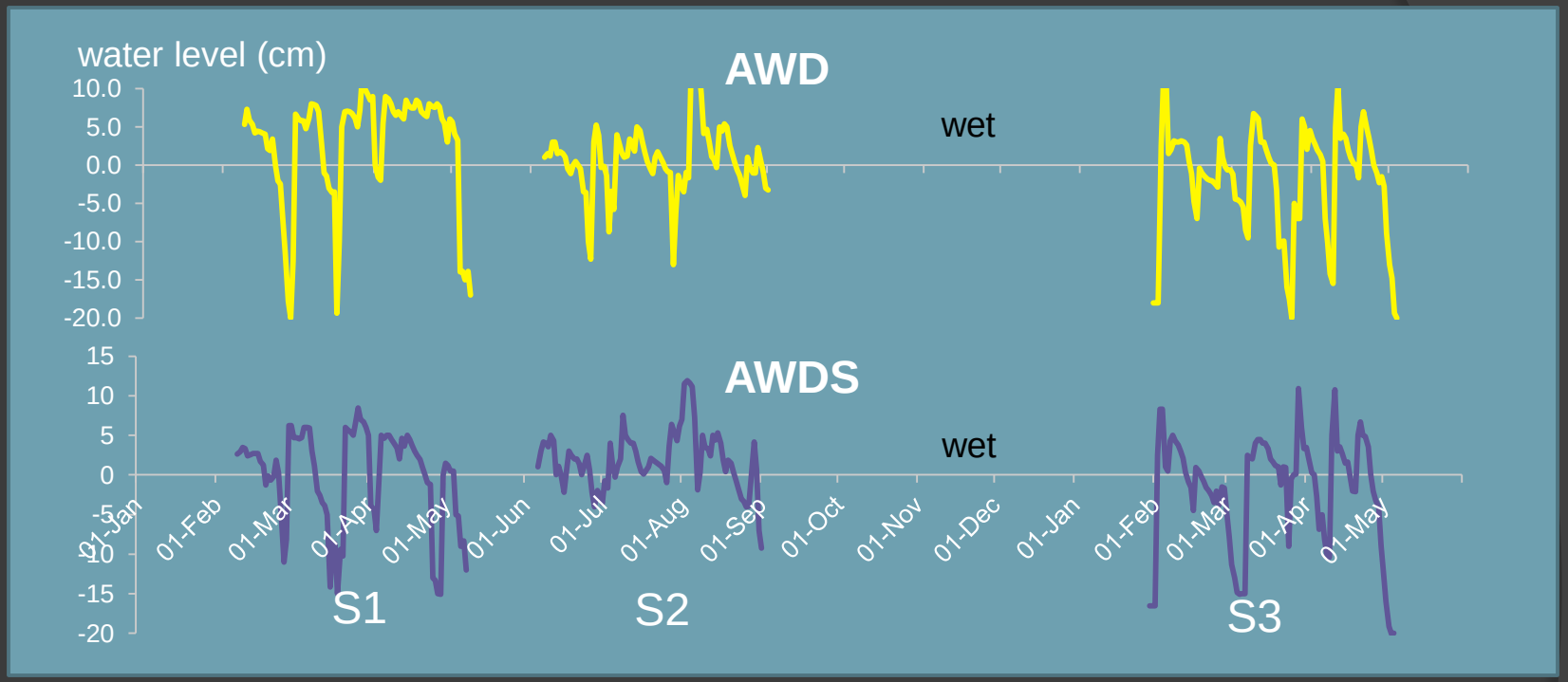
Tsukuba, Ibaraki, Japan

Aug 24-25, 2015

Thua Thien, Hue

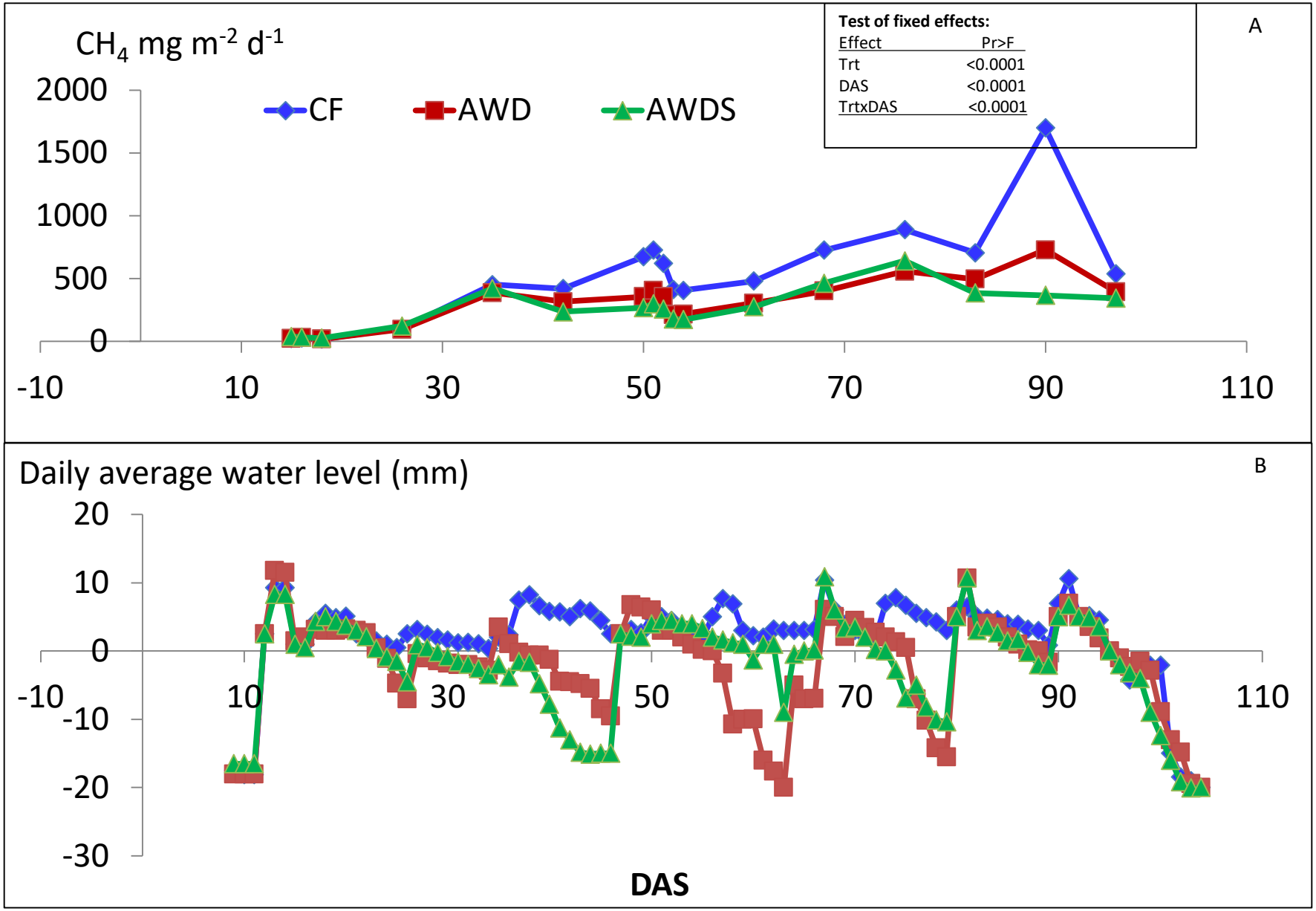


Thua Thien, Hue



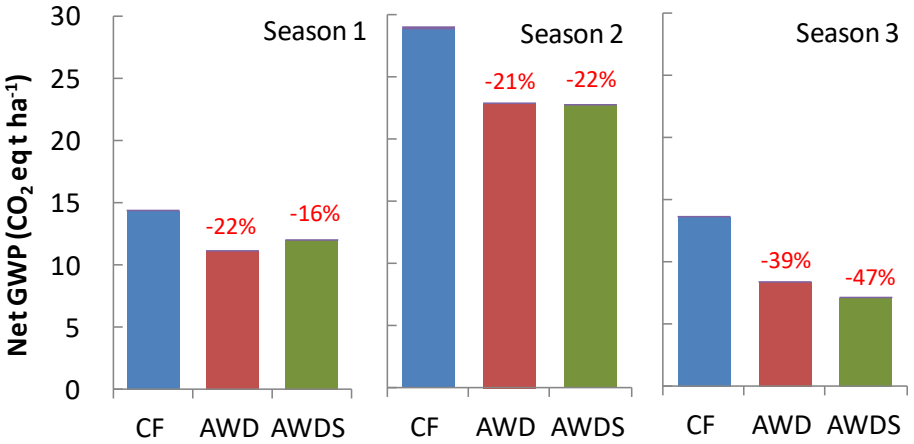
Season	S1			S2			S3		
Water mgt.	CF	AWD	AWDS	CF	AWD	AWDS	CF	AWD	AWDS
CH_4 kg ha^{-1}	512	396	429	1029	814	810	485	299	255
N_2O kg ha^{-1}	0.29	0.36	0.30	1.05	0.71	0.57	0.27	0.05	0.11
GWP CO_2 eq t ha^{-1}	12.9	10.0	10.8	26.0	20.5	20.3	12.2	7.5	6.4
% reduction		22	16		21	22		39	47

Methane fluxes 3rd season (WS 2014 – 2015)

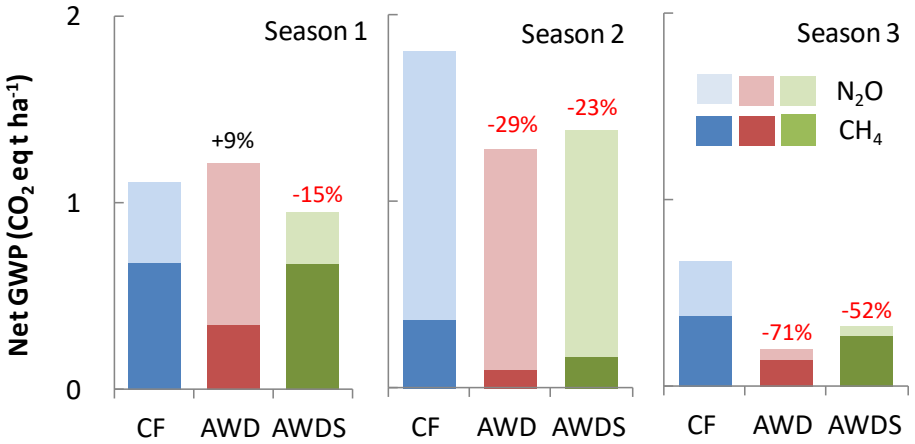


CH_4 + N_2O Emissions in the Season 1-3

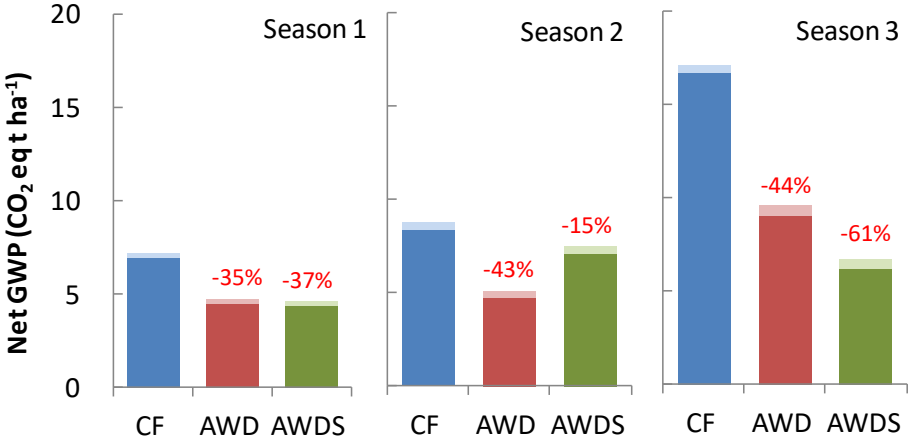
Hue, Vietnam



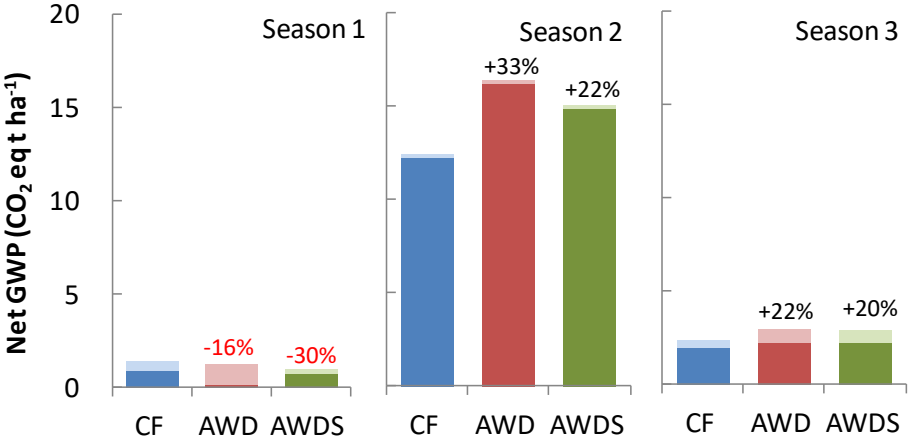
Prachinburi, Thailand



Jakenan, Indinesia



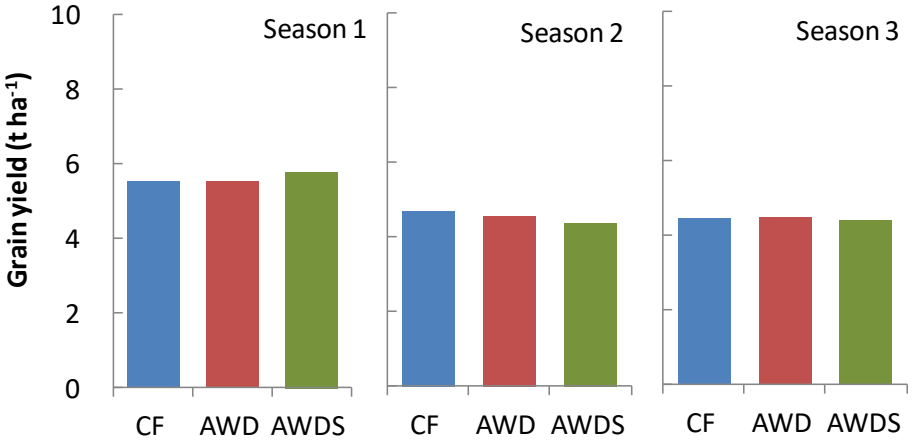
Maligaya, Philippines



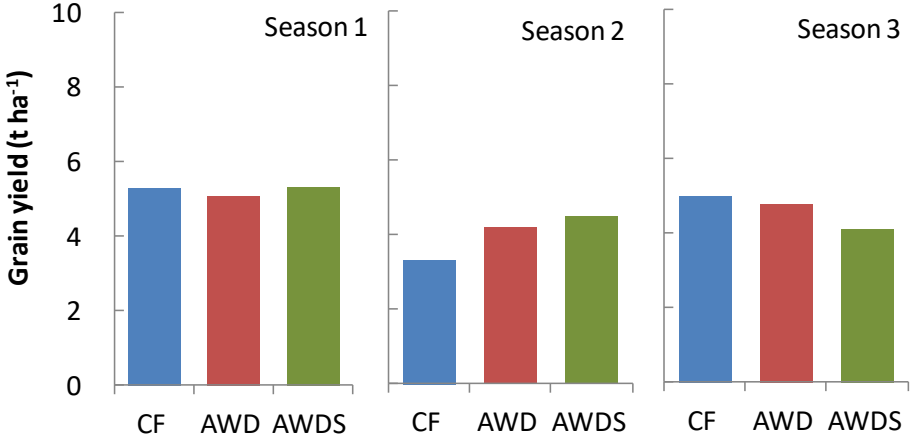
CF: Continuous flooding; AWD: Safe AWD; AWDS: Site-specific AWD

Grain Yields in the Season 1-3

Hue, Vietnam

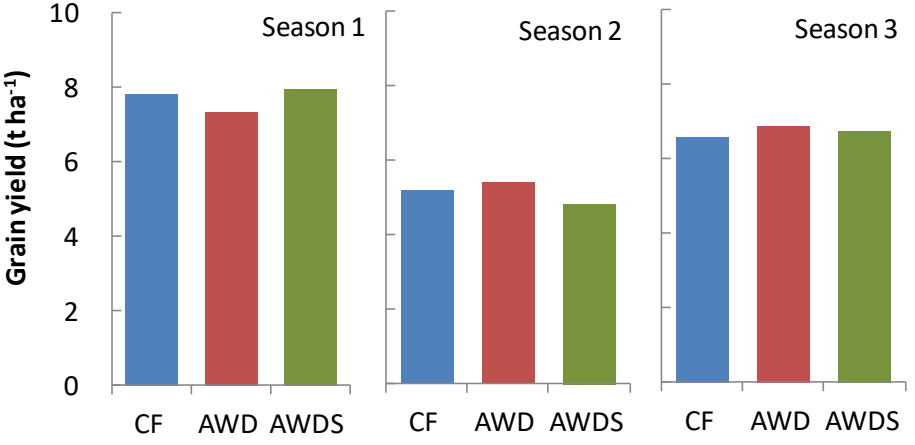


Prachinburi, Thailand



Jakenan, Indinesia

Maligaya, Philippines



CF: Continuous flooding; AWD: Safe AWD; AWDS: Site-specific AWD

Conclusions

- Management of AWD that will lead to optimum reduction in GWP is site specific.
- Soil characteristics, rainfall patterns, and water availability need to be considered in the optimum management of AWD.
- Increasing the number of drainage events or the number days without soil surface water increased reductions in GWP in 3 of the 4 sites.
- AWD sometime increased N_2O emissions in Muñoz, Nueva Ecija and Jakenan but not enough to offset CH_4 emission reductions.
- The high increase in CH_4 emissions during the first 2 weeks after transplanting (before AWD could be practiced) due to the incorporation of rice stubbles, overshadowed the CH4 emission reduction at later stages.

Near-future milestone