Does UVB seed priming affect different traits in rice genotypes under drought Stress?

Norina Murtaza[1]*, Kai Behn[1] Shyam Pariyar[1]

[1] University of Bonn, Germany, INRES Plant Nutrition at the University of Bonn

UNIVERSITÄT BONN

Introduction

- Drought stress is a critical constraint to rice (*Oryza sativa)* productivity, particularly in regions experiencing increasing climate variability.
- Ultraviolet Radiation UV-B priming is a known method to overcome abiotic stress responses, defense mechanism and tolerance in the crops.
- UV-B seed priming was applied to investigate the phonological and physiological traits of different rice genotypes under control environment.

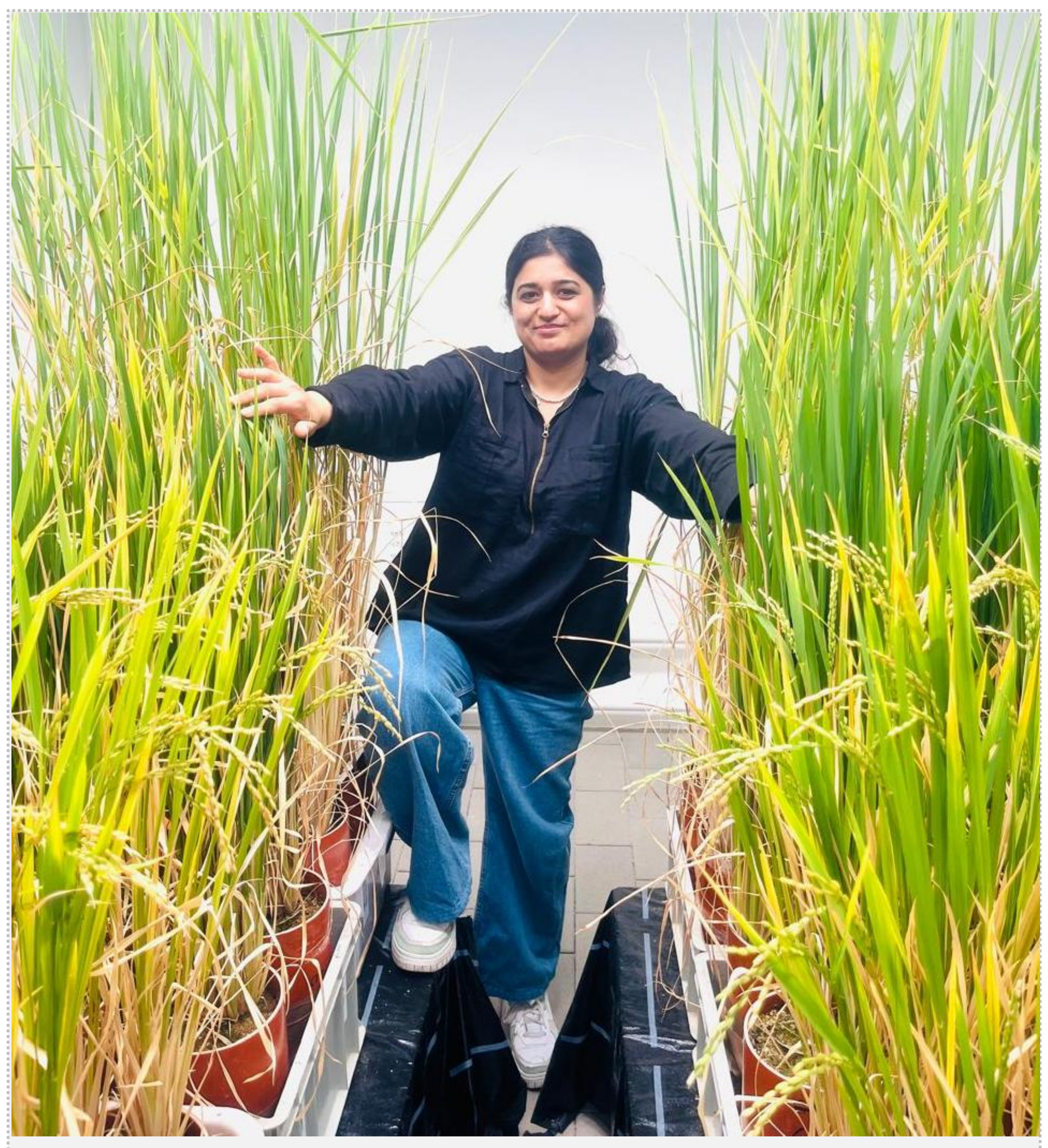

Figure 1: Drought (right) and control (left) rice plants grown in soil pots in the controlled greenhouse condition at the University of Bonn.

Materials and methods

Experiment Setup:

3 Rice genotypes: IR 29 (sensitive), Marshi FL483 (tolerance), Marshi (highland, not known) were tested.

Seed Priming:

Seeds: untreated or primed **(UV-B, 7 KJ m^{-2} hr^{-1})**

Two water regimes:

I. Well watered (control)

II. Drought stress (gradual water reduction leading to wilting, then re-watered)

Drought Induction:

Initial drought – observations taken 10 days after drought induction

Severe drought (wilting stage) – observations taken after 24 days

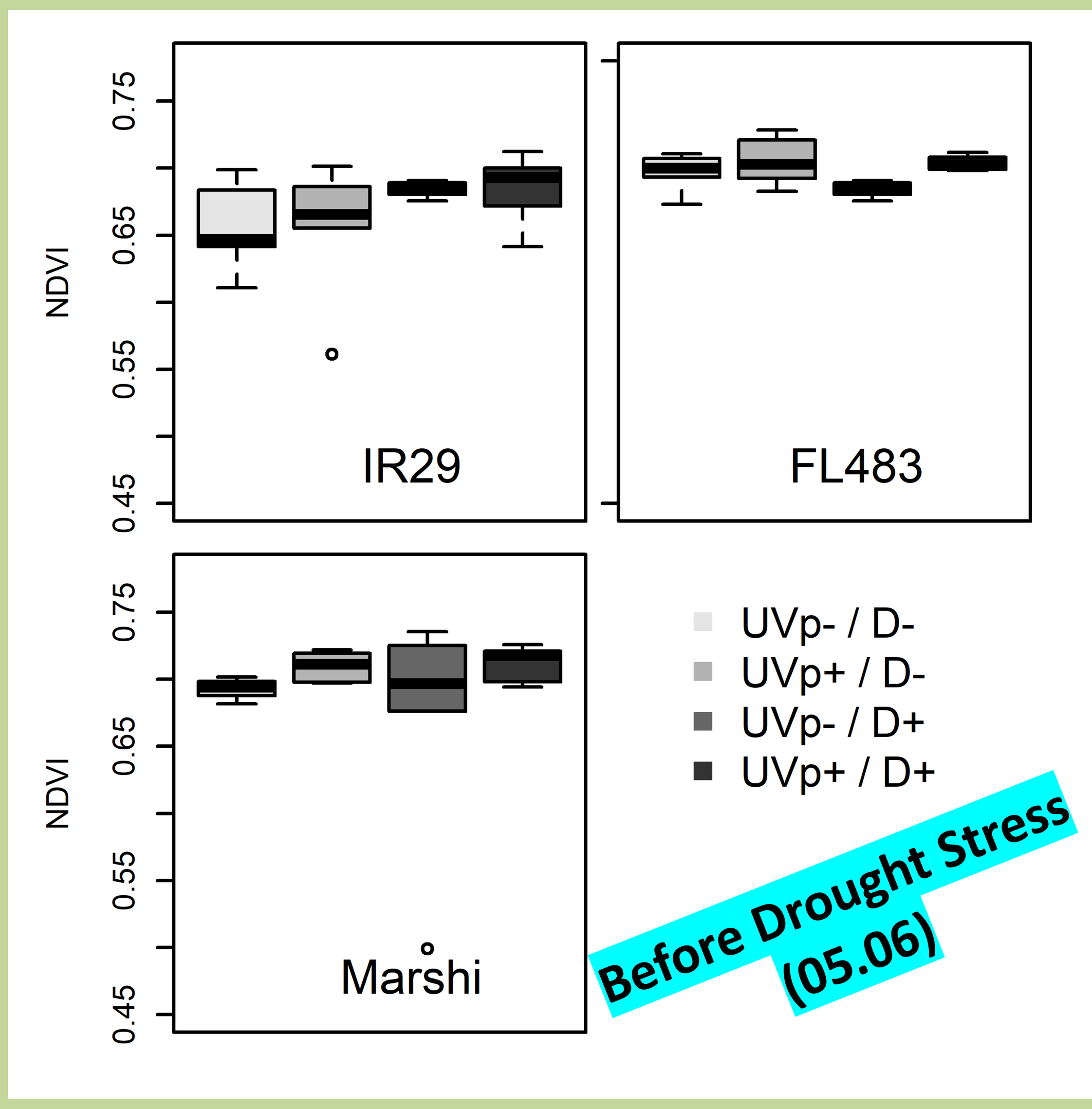

Figure 2: Normalized Difference Vegetation Index (NDVI) of different rice cultivars - IR29, FL483 and Marshi. N = 6. UVB-primed treatment improved NDVI for all three cultivars under both conditions (± drought).

Conclusion and Outlook

- ✓ UVB-seed priming increased NDVI of all genotypes (IR29, FL483,and Marshi) under both water regimes and, before and after drought stress.
- ✓ UVB-treatment reduced anthocyanin content in both control and drought treatments for drought sensitive cultivar IR29.
- ✓ UVB-priming improved grain yield for tolerant genotypes FL483 (drought) and Marshi (UV) under drought condition.
- ✓ The effect of seed priming varied between sensitive or tolerance cultivars to drought stress.

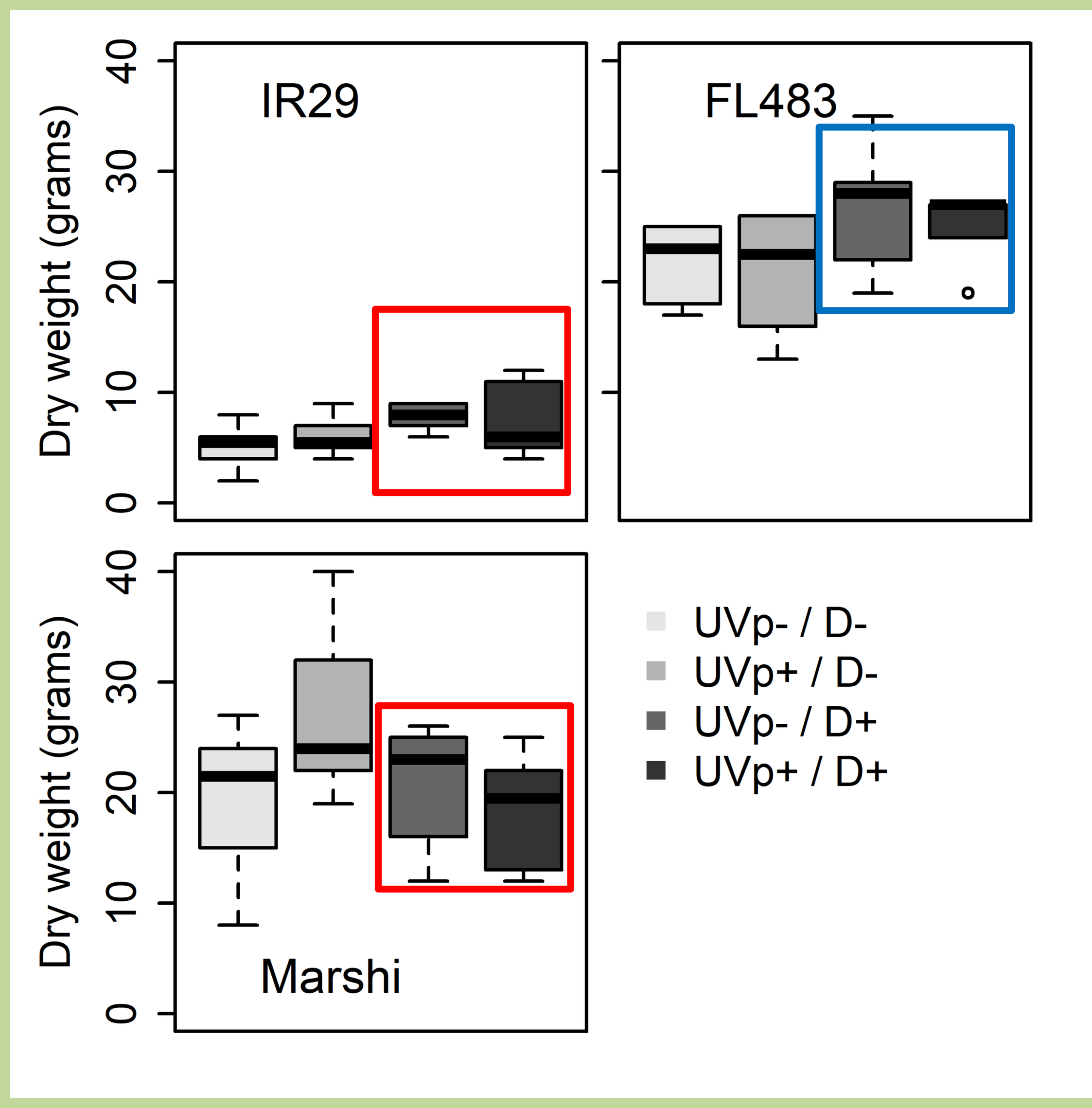

Figure 5: Shoot dry biomass (DM) of different rice cultivars - IR29, FL483 and Marshi. N = 6. UVB-primed improved DM at control condition (IR29 and Marshi), but under drought treatment, this trend was observed only for tolerant genotype FL483.

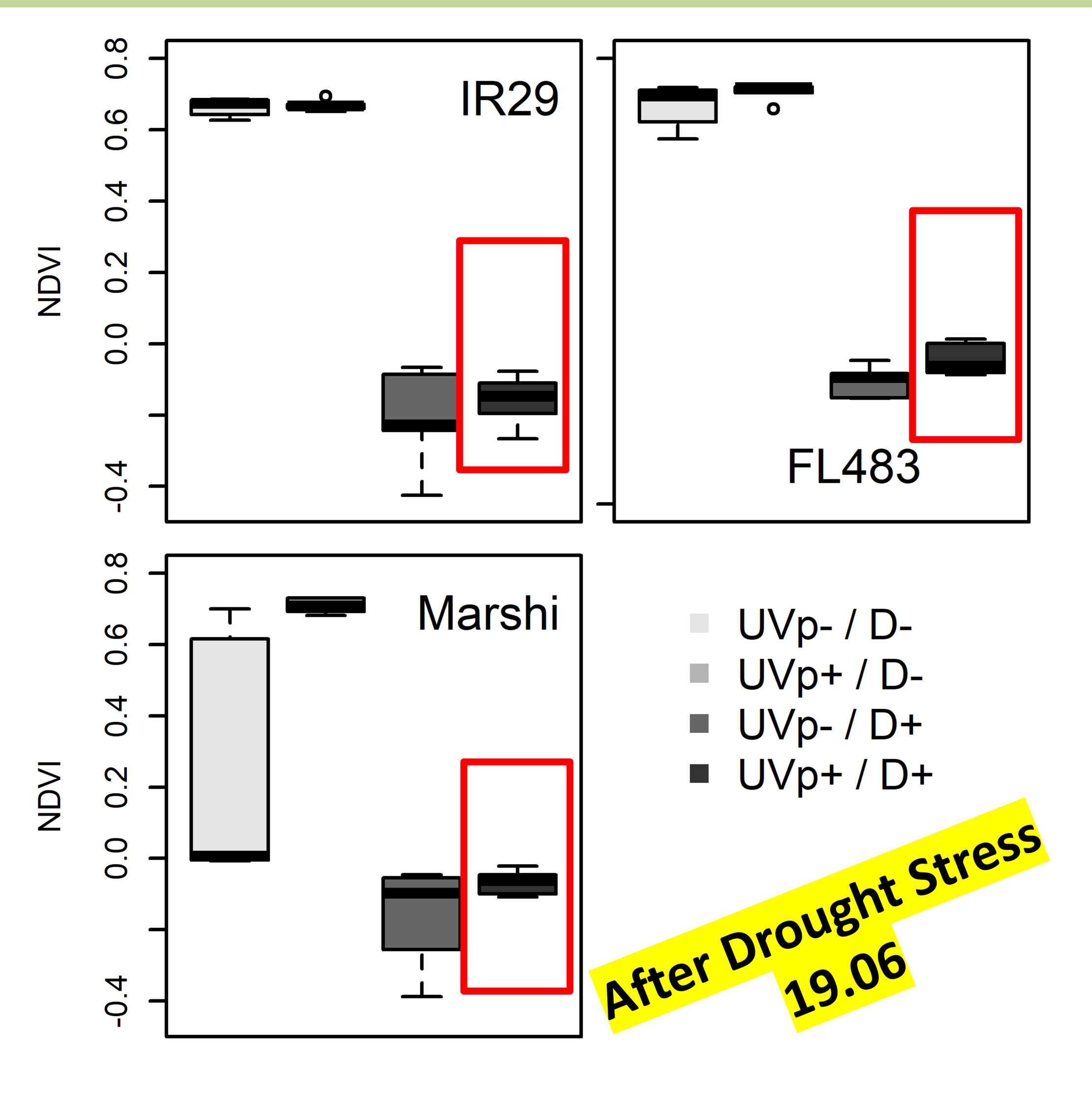

Figure 3: Normalized Difference Vegetation Index (NDVI) of different rice cultivars - IR29, FL483 and Marshi. N = 6. Drought reduced NDVI for all cultivars and UVB-primed treatment improved NDVI for all three cultivars under both conditions (± drought).

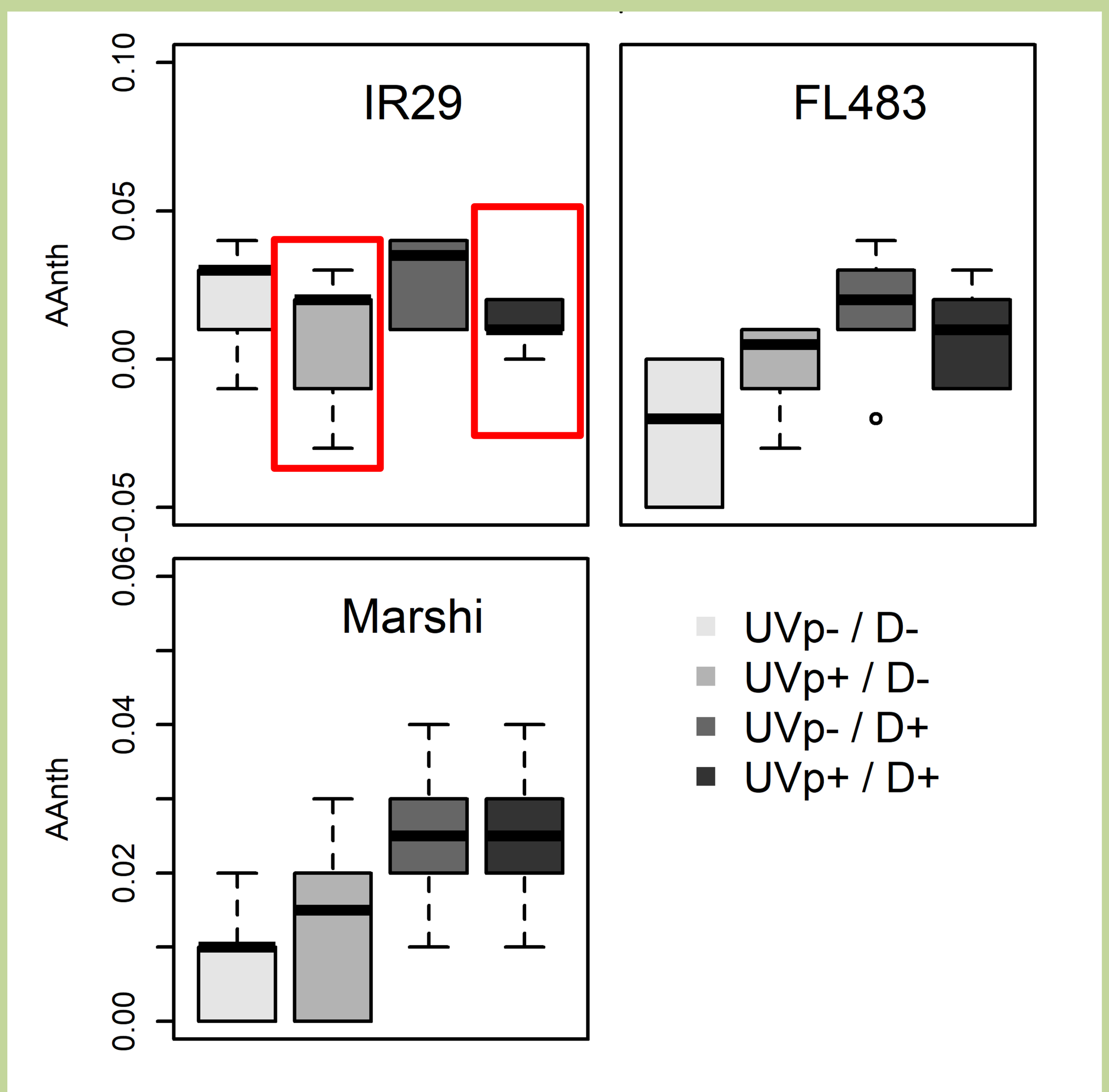

Figure 4: Leaf anthocyanin index (Aanth) of different rice cultivars - IR29, FL483 and Marshi. N = 6. UVB-primed treatment reduced anthocyanin content in both control and drought treatments for drought sensitive cultivar IR29.

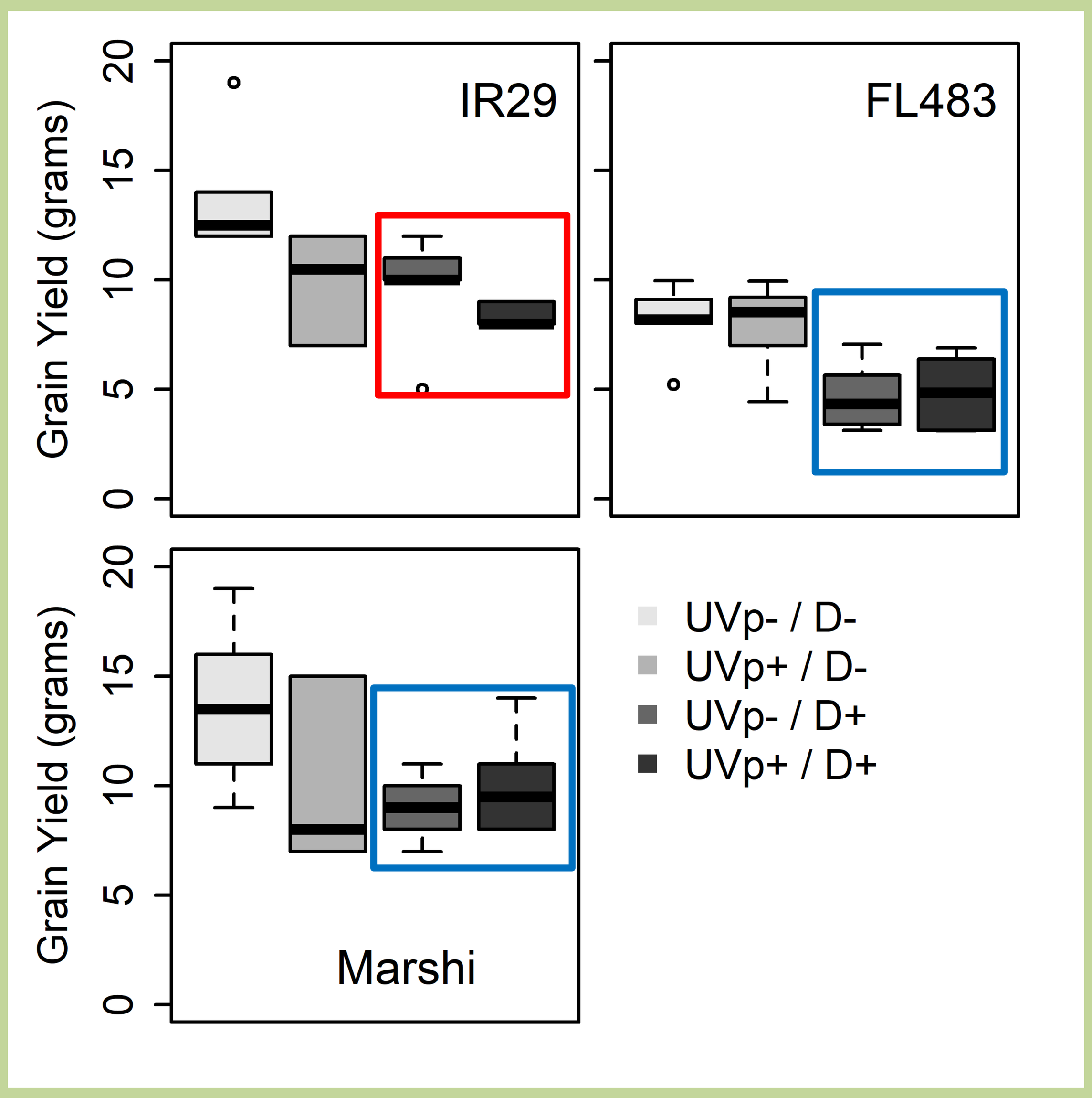

Figure 6: Rice grain yields of drought sensitive variety IR29, tolerant variety FL483 and highland cultivar Jumli Marshi. Seeds were either untreated (light colors) or primed (dark colors) with UVB. N = 6

The research activities are financially supported by the Faculty of Agriculture, Nutrition and Engineering and the Department of Plant Nutrition, University of Bonn.

AGRAR-, ERNÄHRUNGS- UND INGENIEURWISSENSCHAFTLICHE FAKULTÄT

Contact:

Norina Murtaza (MSc student)

s28nmurt@uni-bonn.de