

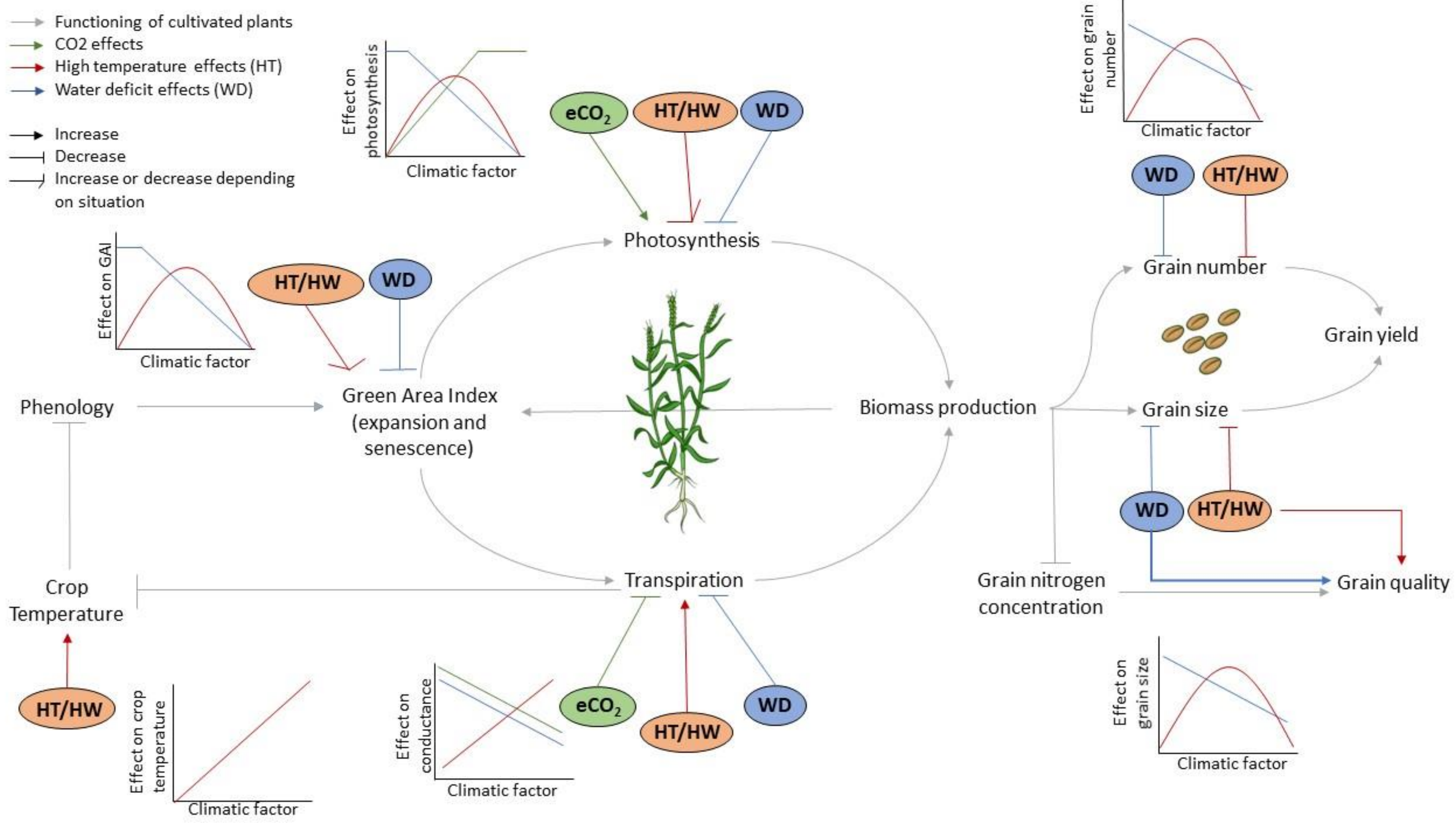


# A review of wheat plasticity to combined elevated CO<sub>2</sub>, warming and water deficit

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## Plasticity in wheat processes to climate change

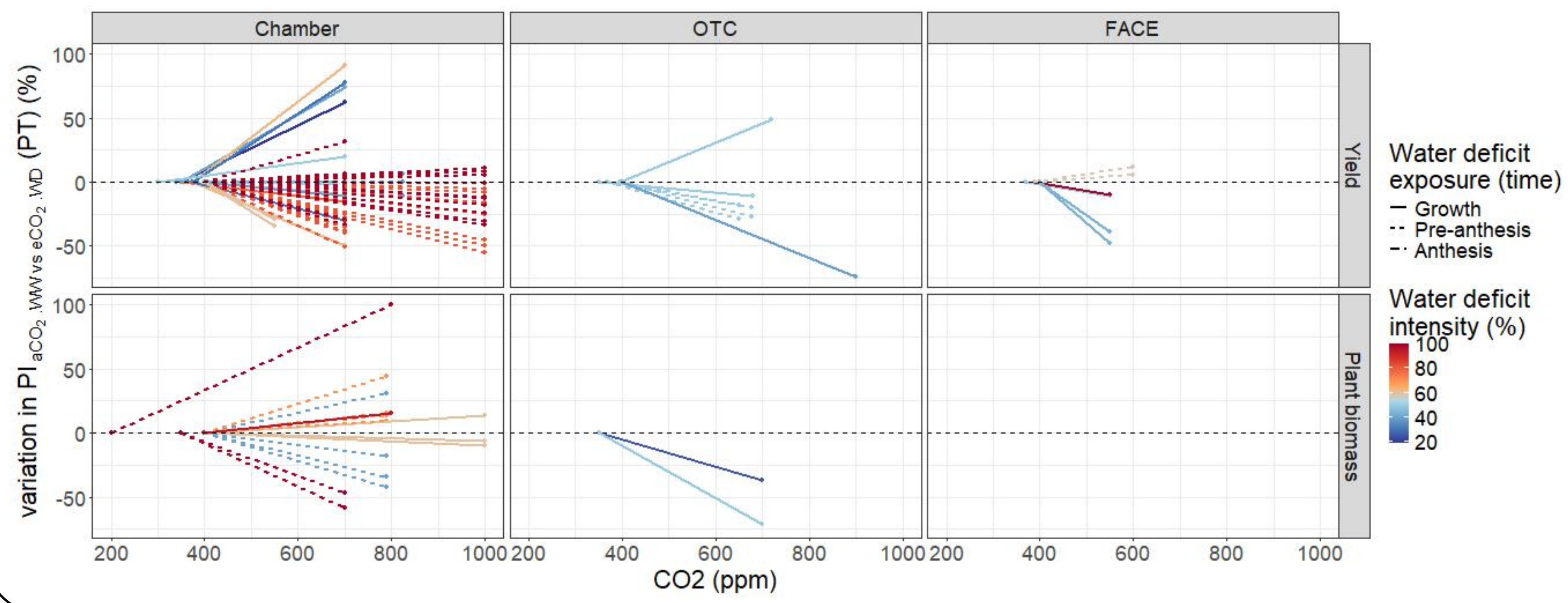


- Photosynthesis
  - + eCO<sub>2</sub> (elevated CO<sub>2</sub>)
  - - HT/HW (high temperatures, heat wave)
  - - WD (water deficit)
- Conductance/transpiration
  - - eCO<sub>2</sub>
  - + HT/HW
  - - WD
- Direct and indirect effects on yield components and quality

## Methodology

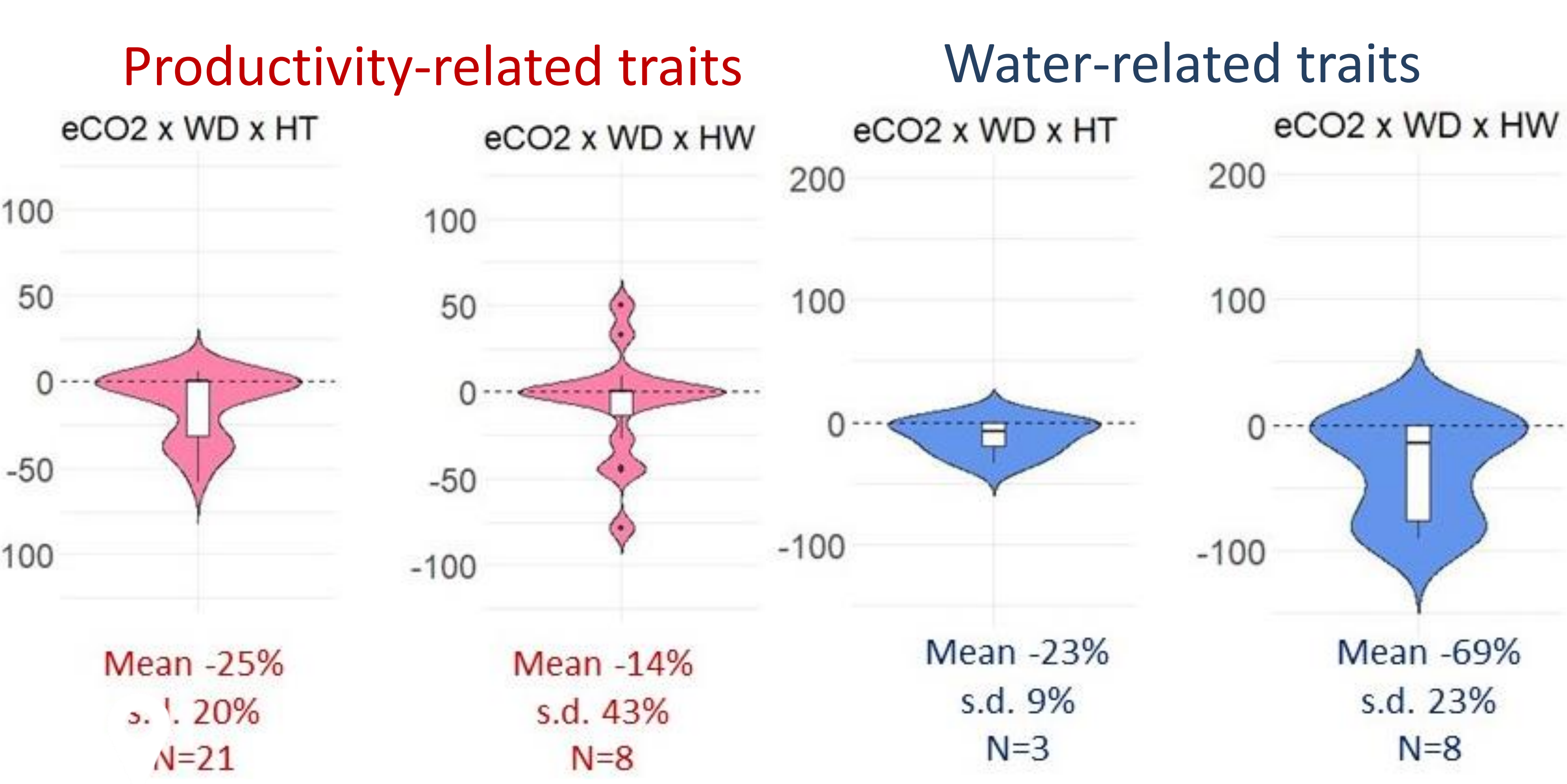
- Articles with experiments studying combinations of eCO<sub>2</sub>, HT, HW and/or WD
- Plasticity indices → relative variation between ambient and future stressed conditions

## Future trends under eCO<sub>2</sub> x WD on productivity



- ➔ Negative trend (-10%) highly variable (sd 33%)
- ➔ eCO<sub>2</sub> effect is not systematically stronger under dry conditions
- ➔ Decreased water consumption (-27%, sd 20%)

## Future trends under eCO<sub>2</sub> x HT/HW x WD



- ➔ Important variability in responses
  - ✓ Diverse experimental protocols (facility, site, stress timing / duration / intensity, cultivars)
  - ✓ Different output variables
- ➔ Strong overall synergistic negative effect of combined heat and water deficit on plant performance, not compensated by eCO<sub>2</sub>

**Experimental studies on the interaction between climatic variables are still lacking and vary widely. There is an urgent need to define common protocol elements to allow improved comparisons and the development of a meaningful database with a range of intensities similar to those projected in the future.**