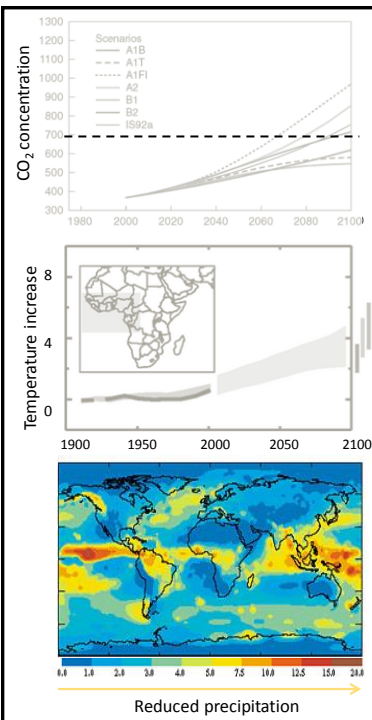




# Growth and photosynthesis in cocoa seedlings at elevated CO<sub>2</sub>

Fiona Lahive



Global CO<sub>2</sub> concentrations predicted to reach ~ 700 ppm by 2100

Average annual temperature in West Africa predicted to increase by ~ 4° C

Mean annual precipitation predicted to decline in cocoa growing areas – increasing length of existing dry period

Large agricultural losses predicted in West Africa due to changes in climate

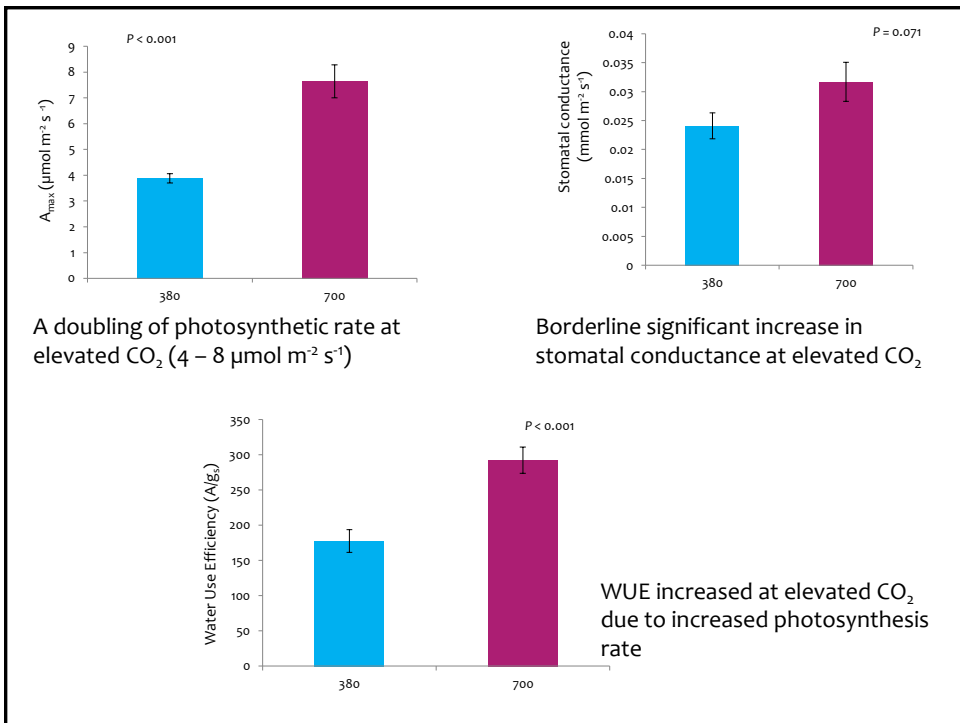
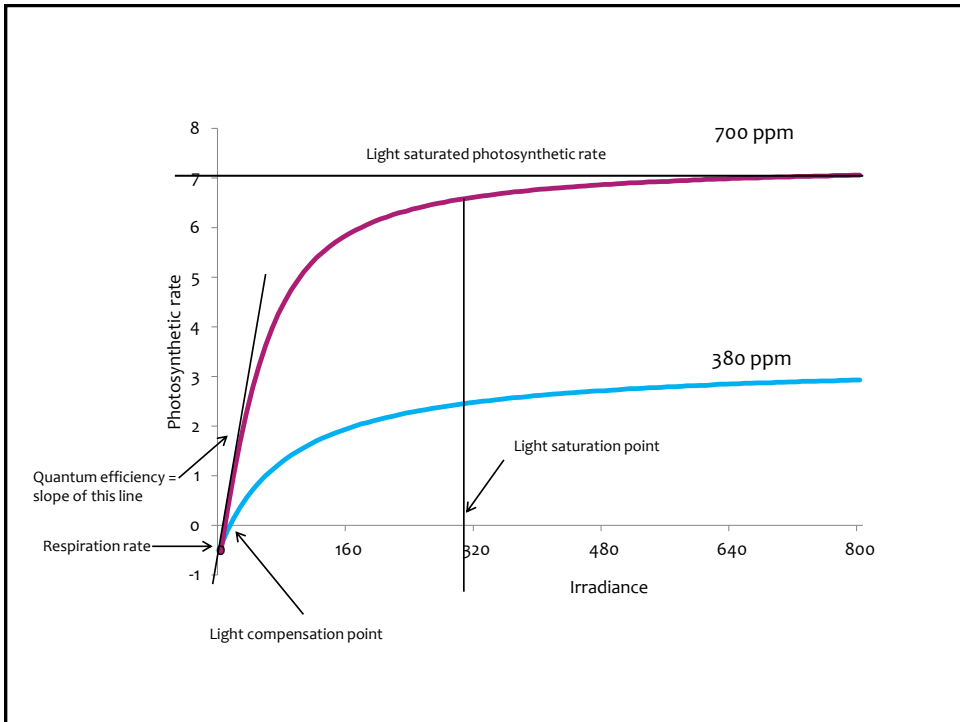
To maintain cocoa production in the future the impacts of these changes in climate on cocoa tree growth need to be assessed

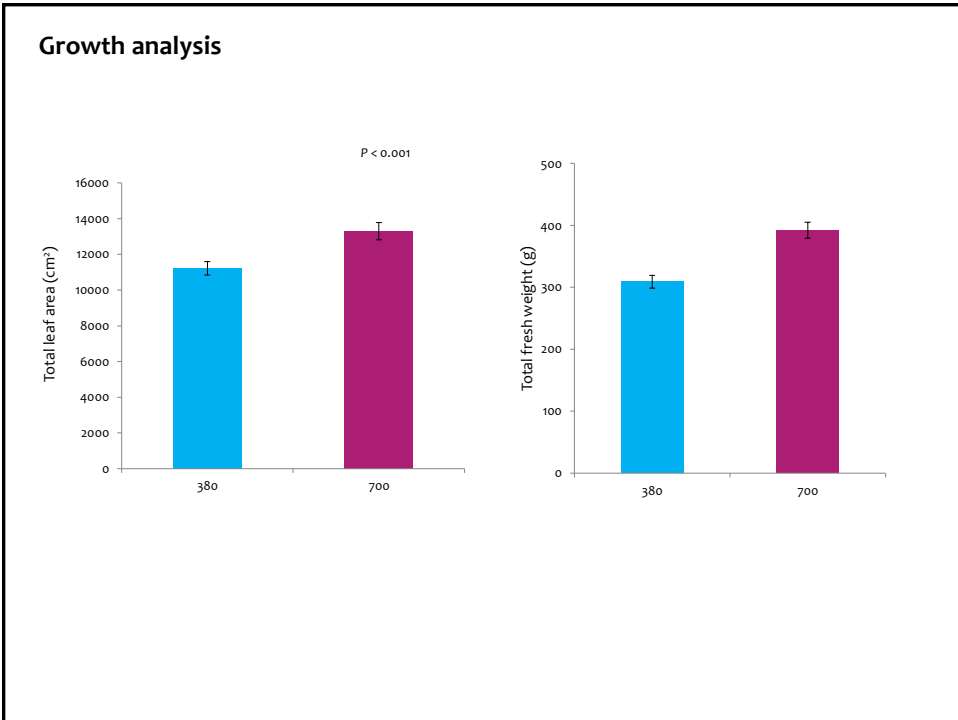
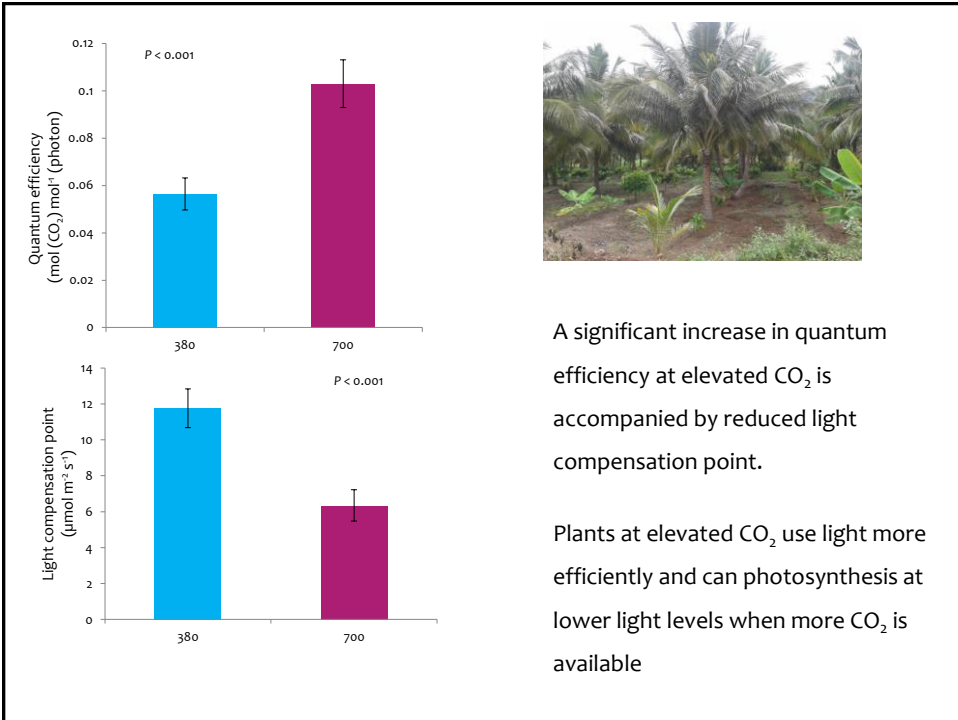
Objective: To assess the impact of elevated  $\text{CO}_2$  on growth and photosynthesis of cocoa seedlings

Method: Grew cocoa seedling (Amelonado variety) at ambient  $\text{CO}_2$  (380ppm) and elevated  $\text{CO}_2$  (700ppm) for 5 months (Dec 2011 – April 2012)

- ❖ Photosynthesis
- ❖ Stomatal conductance
- ❖ Quantum efficiency
- ❖ Light compensation point
  
- ❖ Plant height
- ❖ Leaf area
- ❖ Biomass production







### Conclusions:

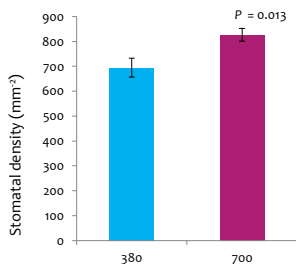
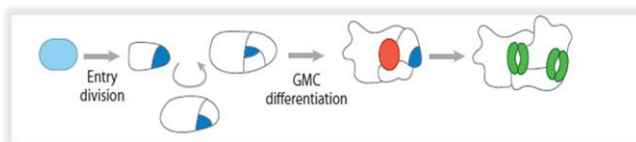
Increase in CO<sub>2</sub> concentration appears to be beneficial to cocoa seedlings

Increasing - Growth  
 Photosynthesis  
 Water Use Efficiency  
 Light utilisation

### Further questions:

How will CO<sub>2</sub> interact with other environmental variables?  
 How (& why) do genotypes differ?

### Molecular aspects of the stomatal response to elevated CO<sub>2</sub>



<i>A. thaliana</i>	<i>T. cacao</i>	
SPCH	SPCH	Tc03_g017560
MUTE	MUTE	Tc04_g022930
FAMA	FAMA	Tc04_g022450
SCRM1	ICE1	Tc04_g005090
SCRM2	ICE1	Tc04_g005090
FLP	predicted protein	Tc02_g033830
MYB88	predicted protein	Tc02_g033830
CDKB1;1	CDBK1:2	Tc00_g060790
CYCA2;3	CYCA2:3	Tc00_g024000

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