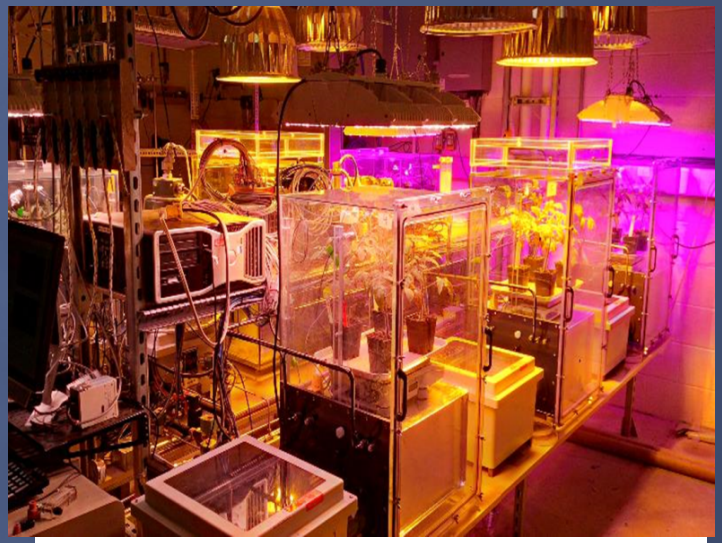
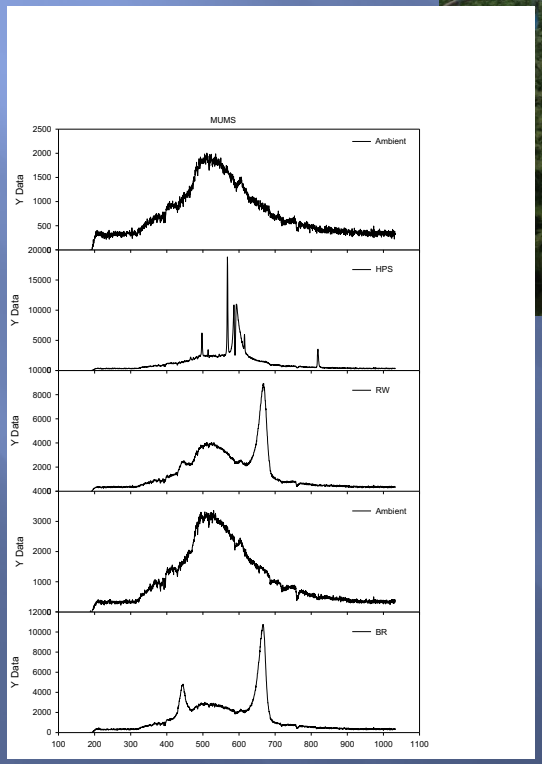
LEDS- LISIANTHUS AND CHRYSANTHEMUM UPDATE

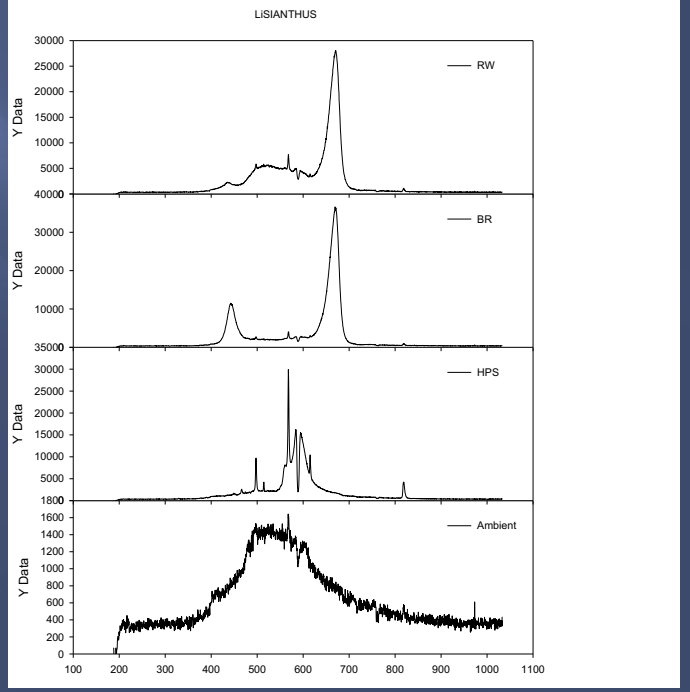
February 1st 2017
FCO Meeting/Grimsby

Bernard Grodzinski


HOUSE
7 EAST
KUBOTA




MUMS
Ambient
HPS
RW
Ambient
BR
Y Data


LISIANTHUS
RW
BR
HPS
Ambient
Y Data

LEAF PIGMENT ANALYSES

Table 1. SPAD measurements (means ± SE) .

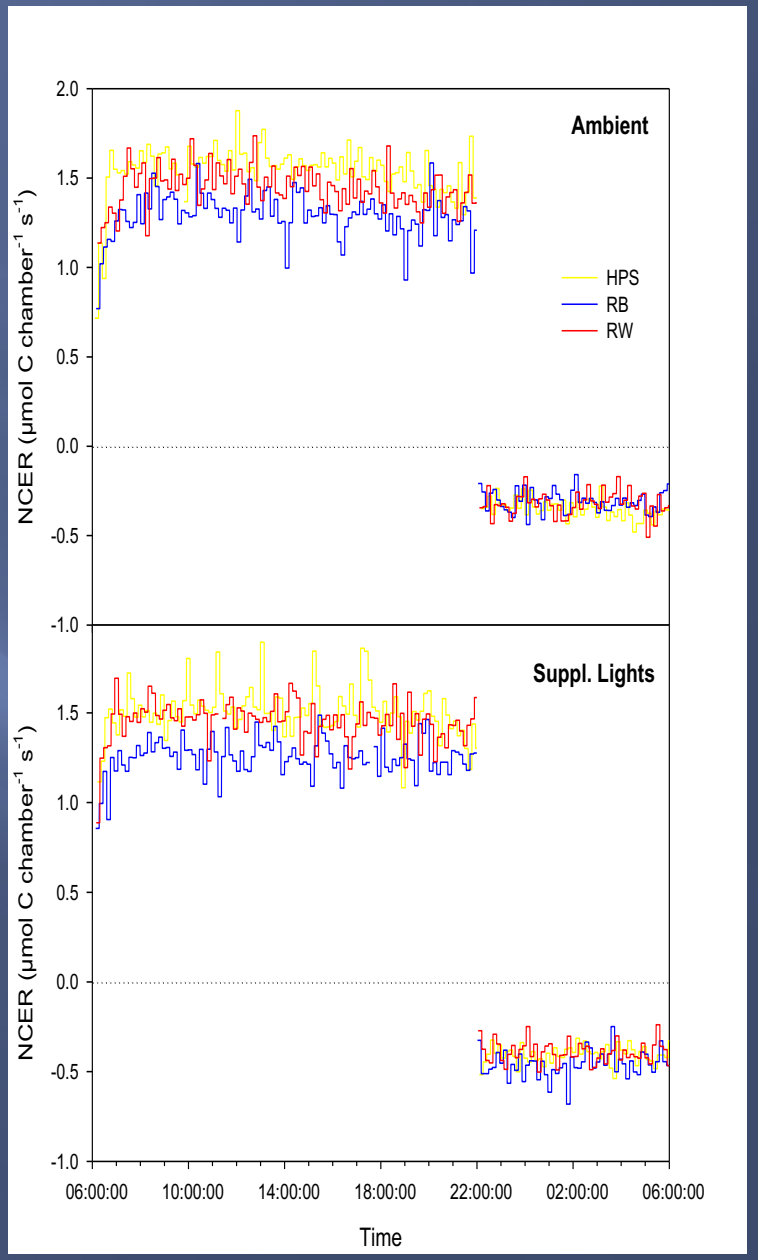
MUMS	Osono		White Reagan		Pink Reagan/Dark Splended		Pink Reagan/Dark Splended		
	(open flowers)		(open flowers)		(flower bud stage)		(flower bud stage)		
RW	55.24	3.34	54.00	2.48	47.52	3.50	43.14	3.56	
Amb	52.26	3.46	53.50	3.08	41.10	4.36	40.14	4.08	
BR	53.30	3.66	58.52	2.07	42.40	3.38	40.30	2.81	
	White Reagan								
	(vegetative stage)								
HPS	32.20	2.43							
Amb	33.90	1.86							
LISIANTHUS		(vegetative stage)							
RW	62.64	6.12							
BR	63.88	4.10							
HPS	63.98	1.09							

Whole-plant gas exchange experiments of Lisianthus

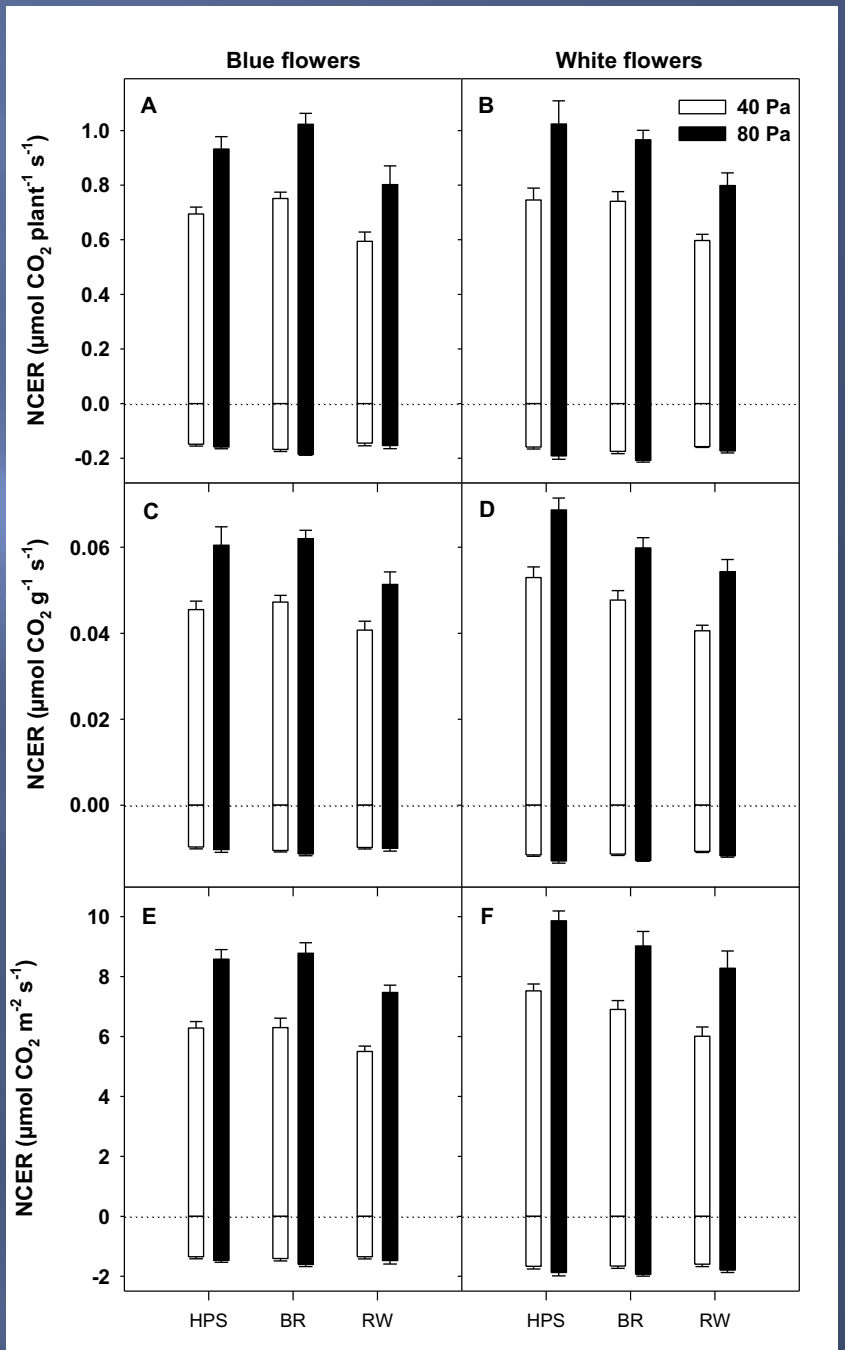
Plants grown at Guelph under ambient and supplementary lighting (HPS, RB & RW LEDs) during (Jan-Mar).

Whole plant gas exchange measurements represent short term exposure (24-36h) to HPS, R/B and R/W LEDs and to high CO2. Two varieties (a blue and a white flower) were tested.

Whole plant gas exchange data: "Photoperiod stability testing"



Lisianthus NCERs on a plant,
dry mass and
leaf area basis.



Daily C gain on a plant, dry mass and leaf area.

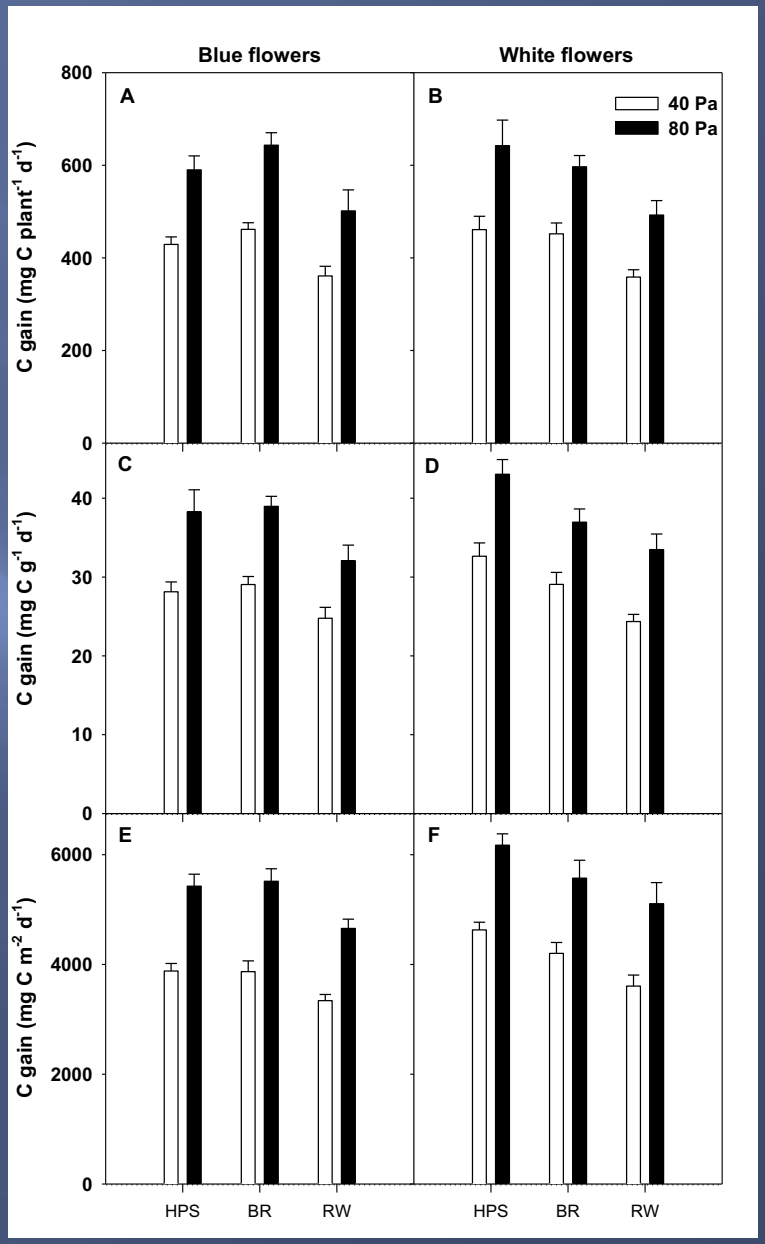
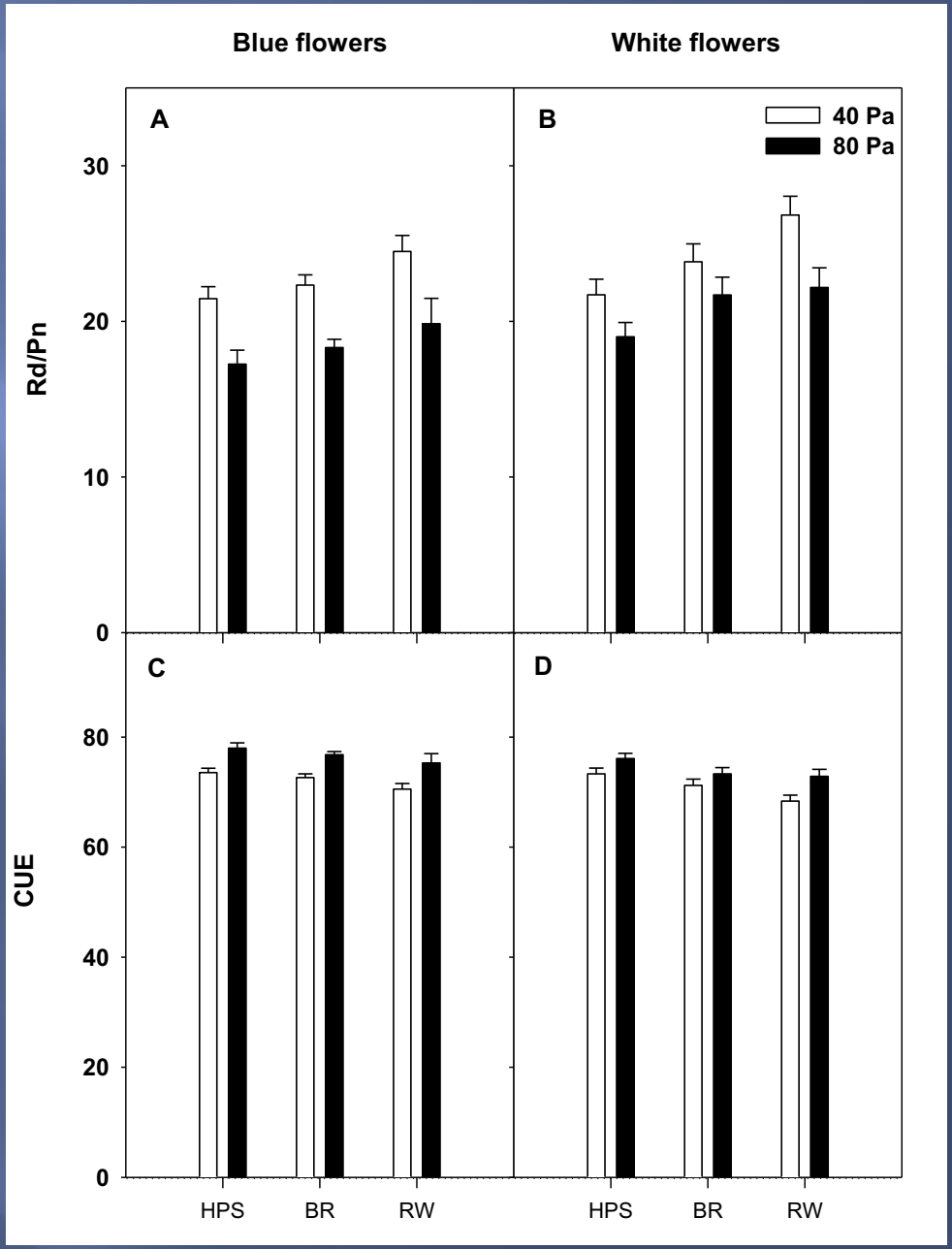


Fig.29. Ratio of Rd/Pn (%) and CUE.

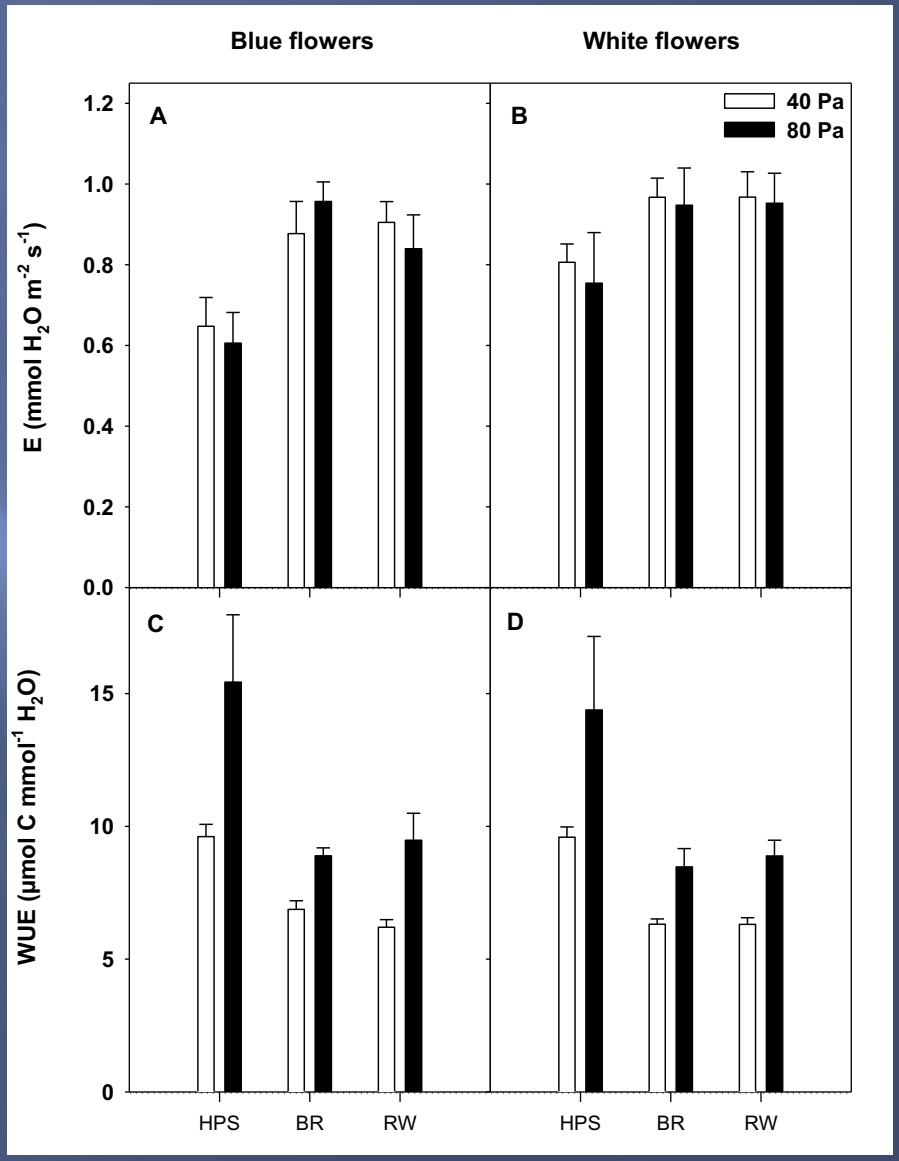
Both varieties showed similar results. The ratio of Rd/Pn was higher under **RW** LEDs.

However, CUE is slightly lower under **RW** LEDs.

High CO_2 reduced the ratio of Rd/Pn but increased CUE under all lights only slightly.



Transpiration and WUE.



Transpiration was lower under HPS and similar under BR and RW LEDs.
High CO2 did not affect transpiration rates, but increased WUE under all lights.
Data for the two Lisianthus varieties could be pooled.

Greenhouse experiment of Lisianthus (Winter - Spring 2016)

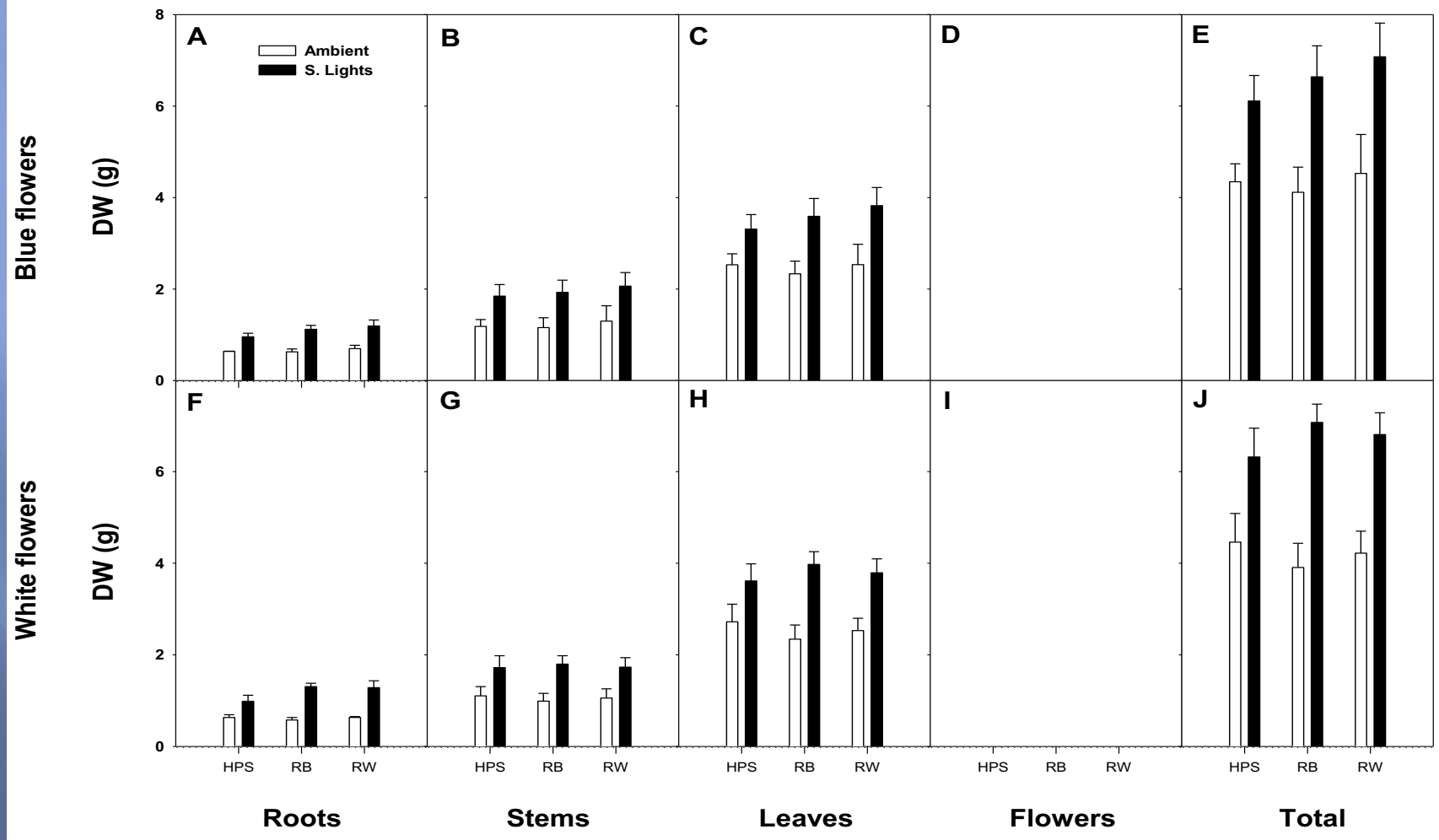
Xiao's project : Lisianthus (Blue and white CVs) were grown under ambient and supplementary lighting (HPS, RB & RW LEDs) in Guelph from mid-Dec 2015 to mid-May 2016.

These plants were used for growth and yield analysis as well as leaf and whole plant gas exchange measurements. Leaf gas exchange was measured in the greenhouse with a portable LI-6400 system using the LI-COR RB LED light source.

Whole plant gas exchange was measured in the lab under short term exposure (24-36h) to HPS, R/B and R/W LED lights. Two varieties (a blue and a white flower one) were used.

Biomass Partitioning at early flowering stage

Plant and organ DWs



Metrics reflecting PLANT ARCITECTURE

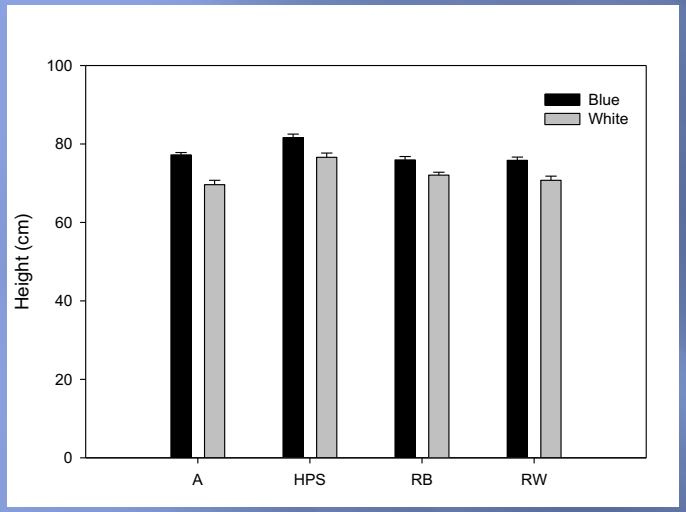
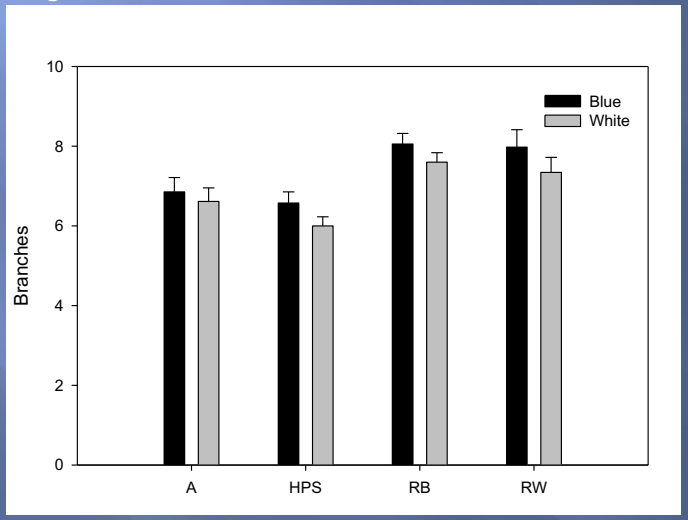
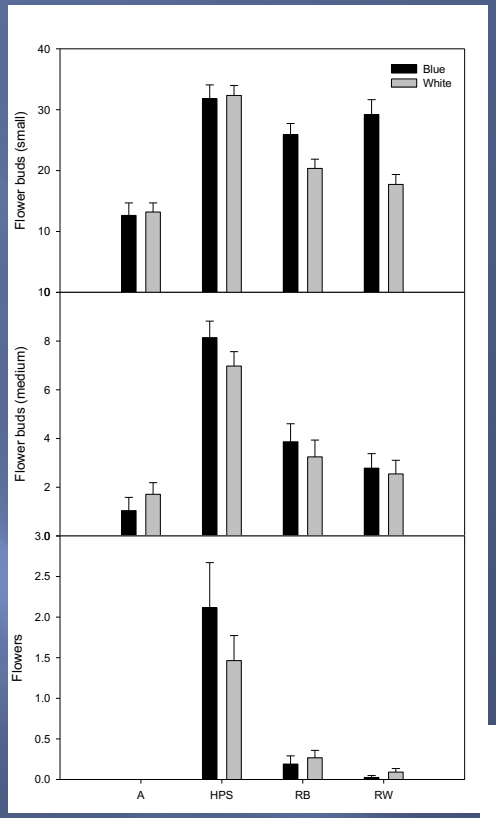
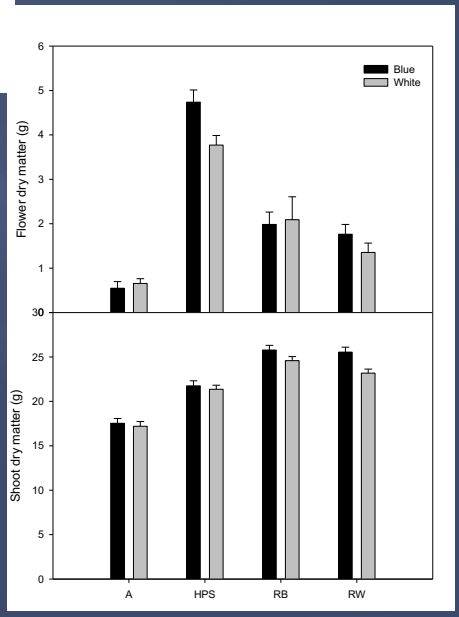


Fig.?? Branches



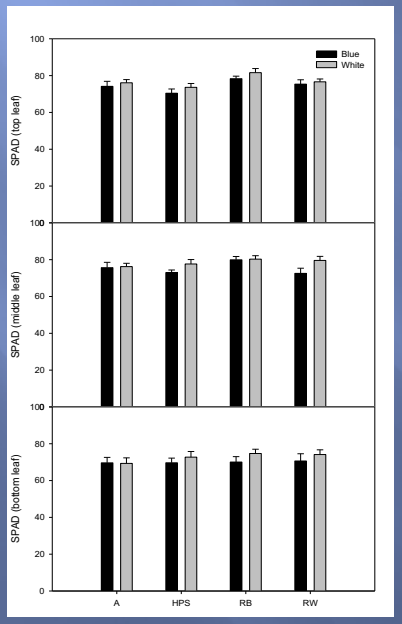


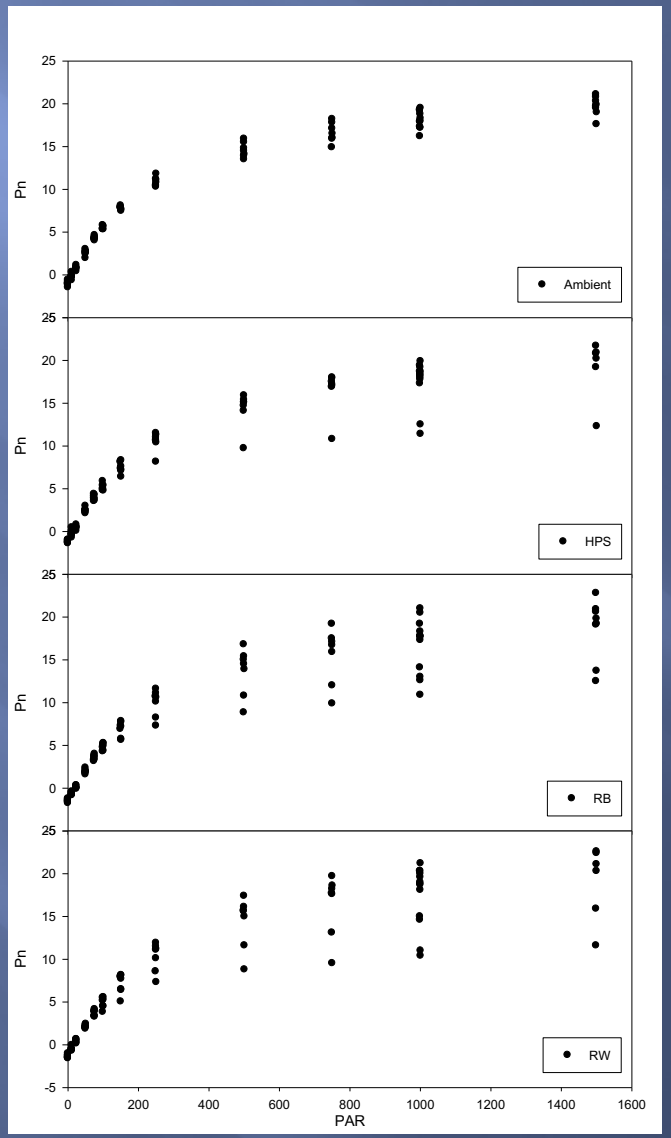


Final Harvest of Lisianthus)

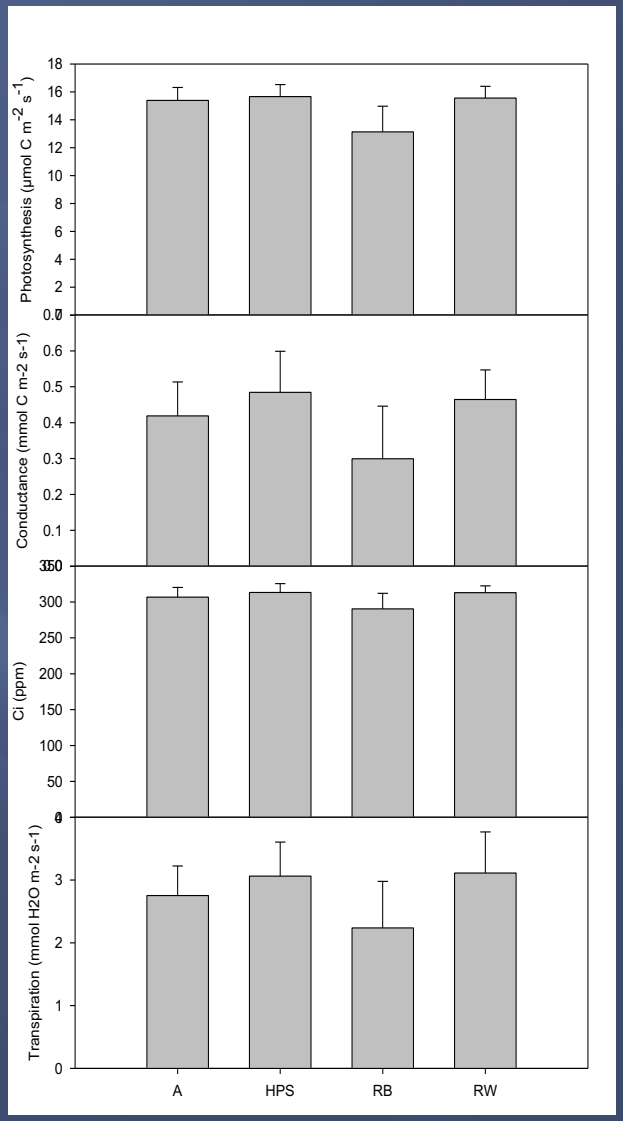
Leaf gas exchange data

Light curves

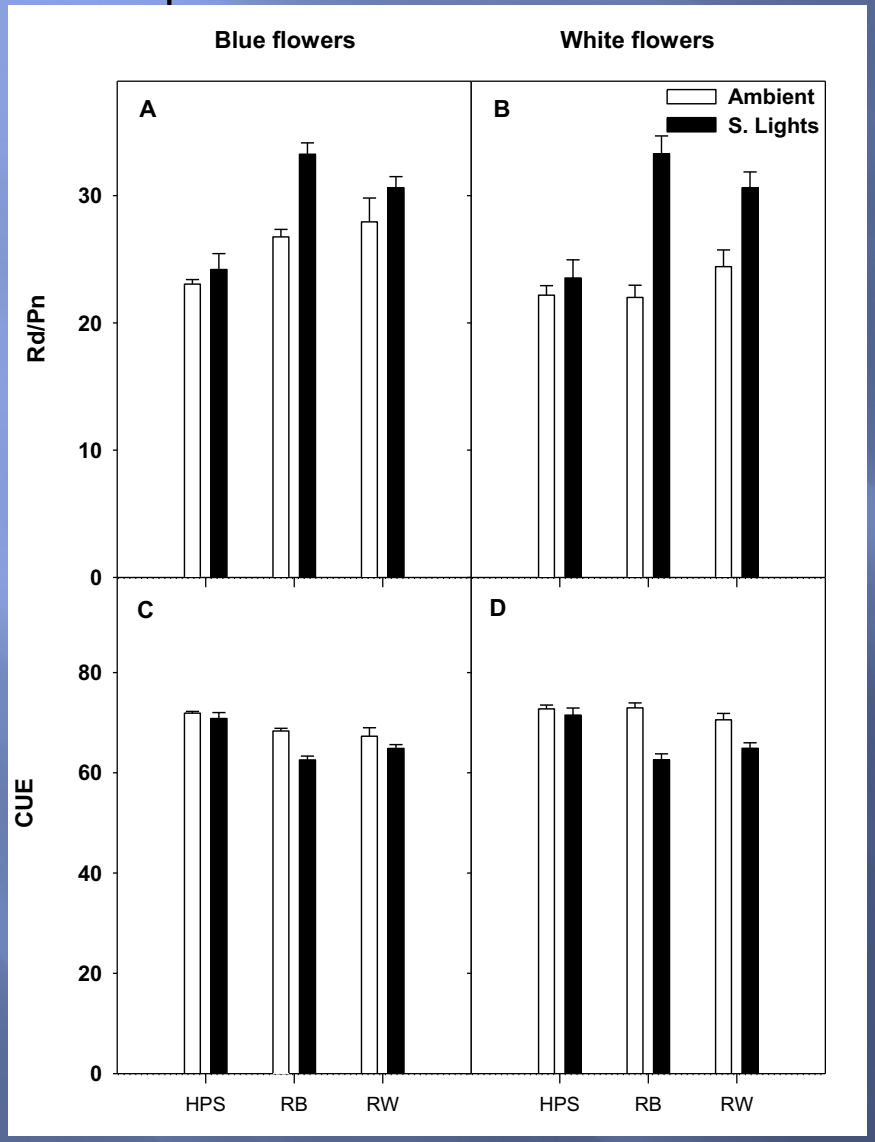




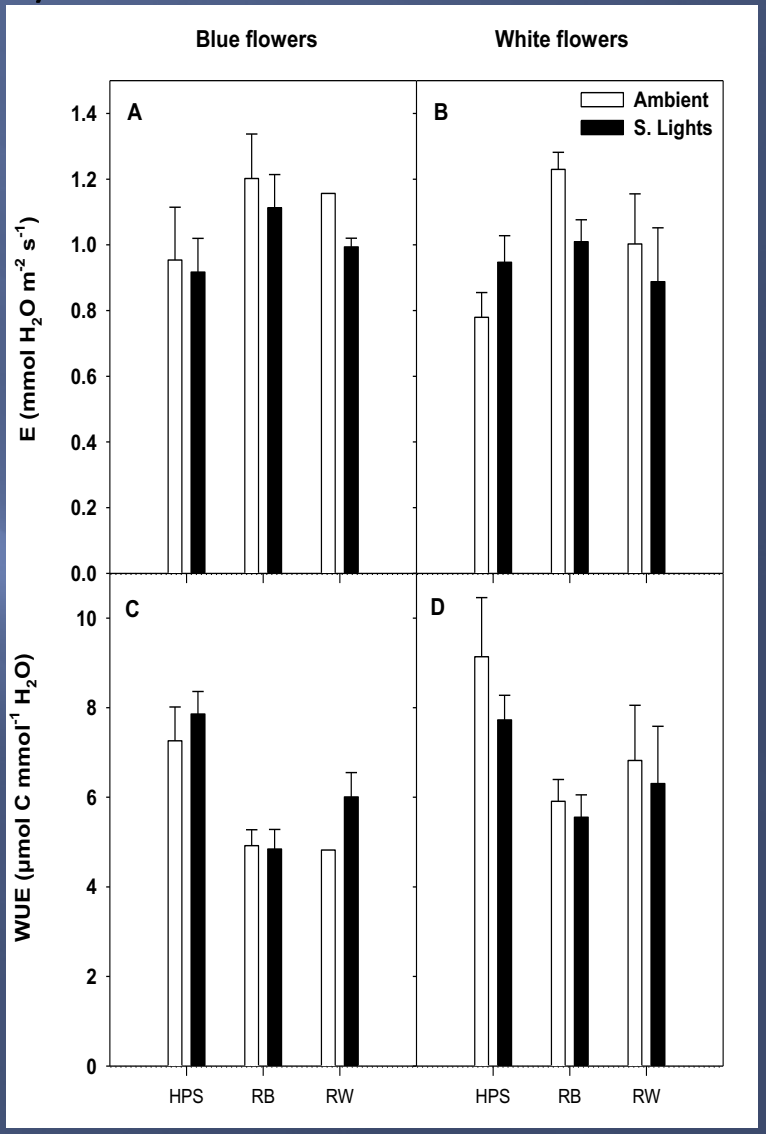
Gas exchange at 500PAR



Transpiration and WUE



Rd/Pn and CUE

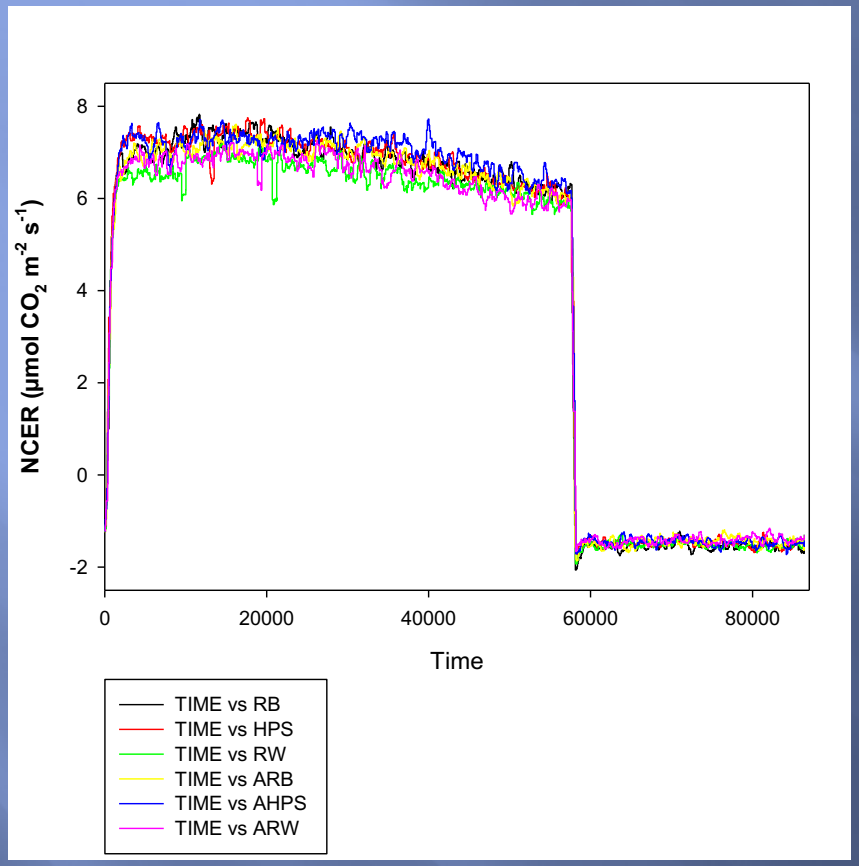


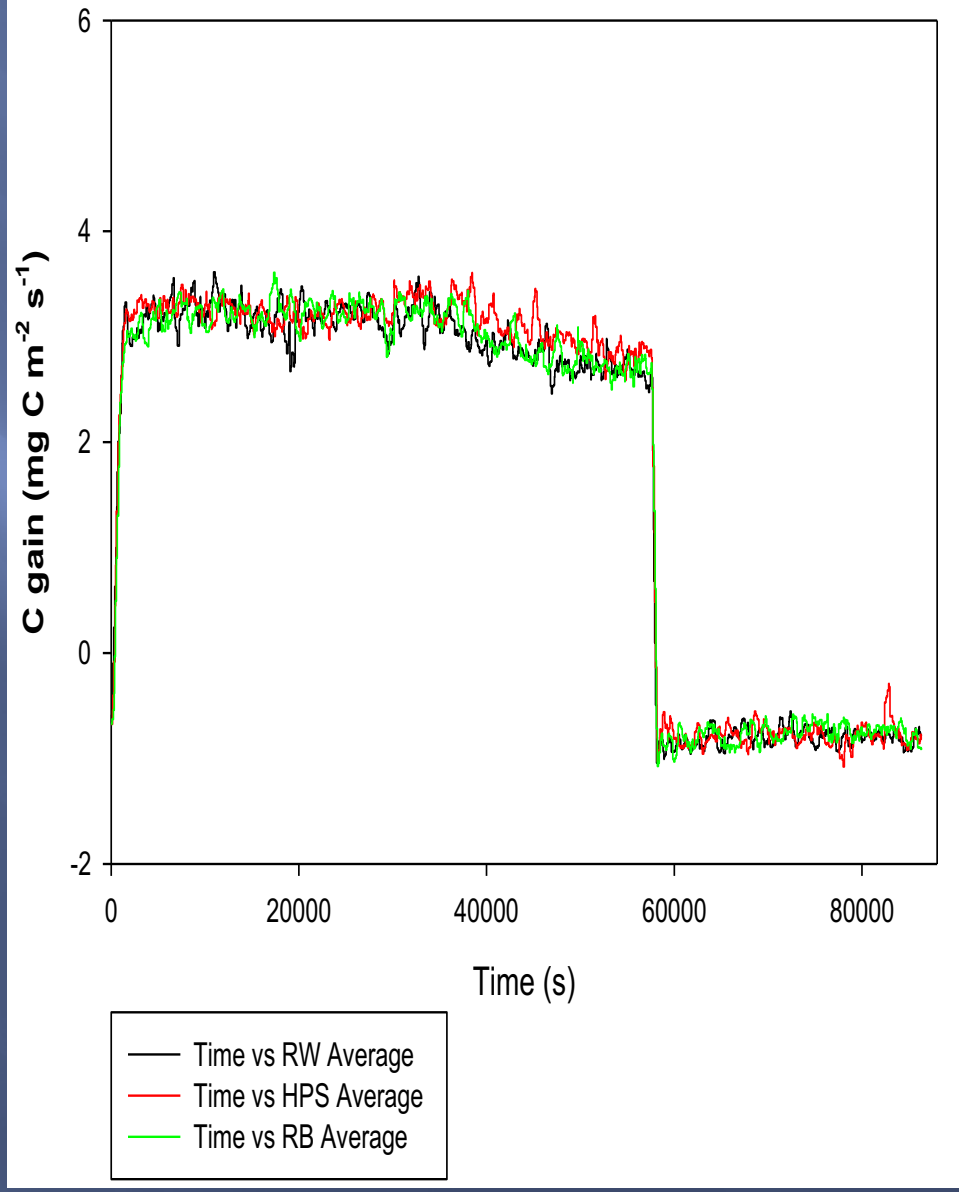
Ongoing 2017

- 16/24h feed-chase experiments
- Sugar analysis
- Vegetative and Reproductive Plants

Whole Plant Experiments

MUMs SEEM TO HAVE SIMILAR PHOTOPERIOD PATTERNS?





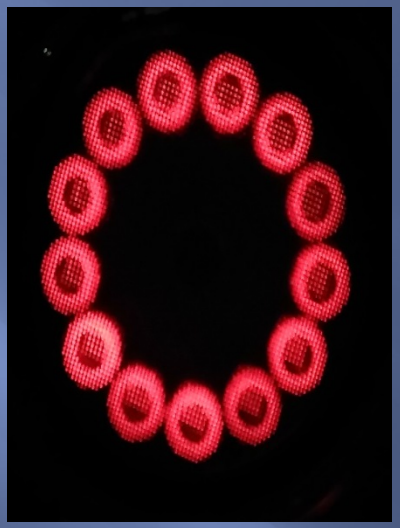
LEAF DATA- CHRYSANTHEMUM (comparing to TOMATO)

- Hypothesis: Wavelength specific lighting effects the photosynthetic capability, sugar partitioning ratio and sugar export rates
- Objectives:

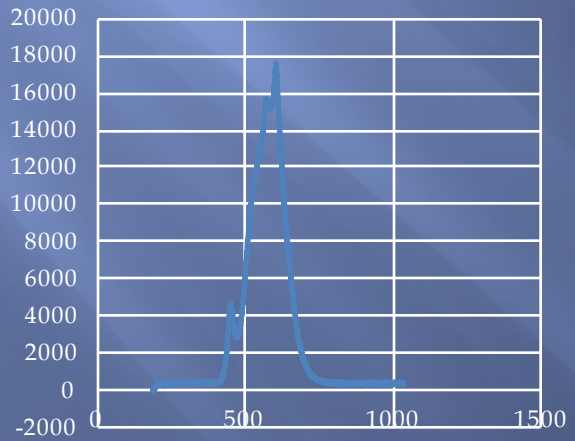
1) Determine if wavelength specific lighting alters the diurnal pattern during short term and long term irradiance

2) Determine if short term illumination with wavelength specific light alters leaf photosynthetic rates

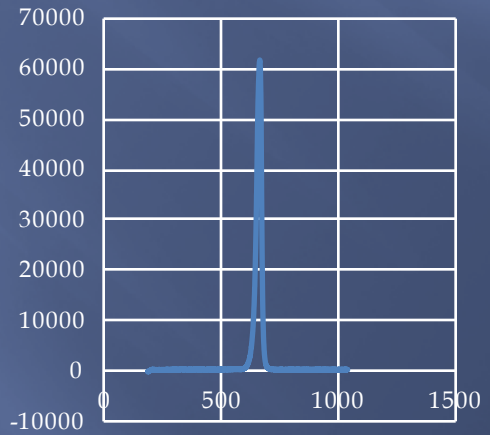
3) Determine if sugar partitioning ratios and sugar export rates are altered due to wavelength specific lighting



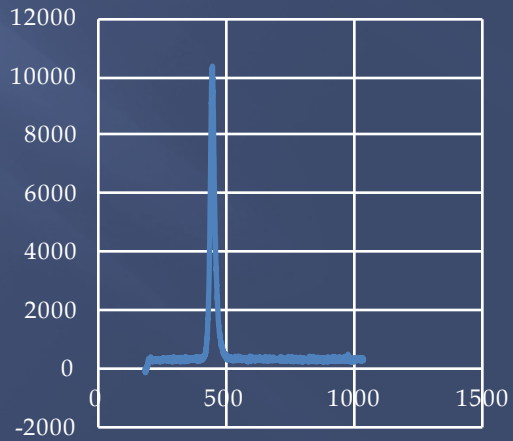
White

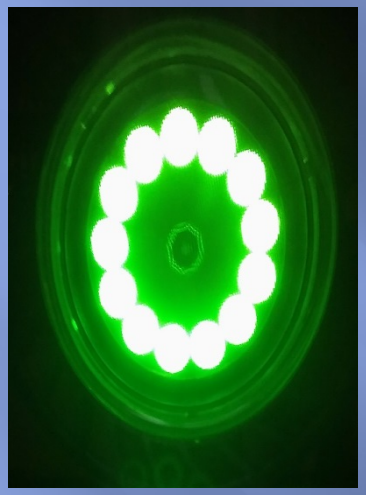


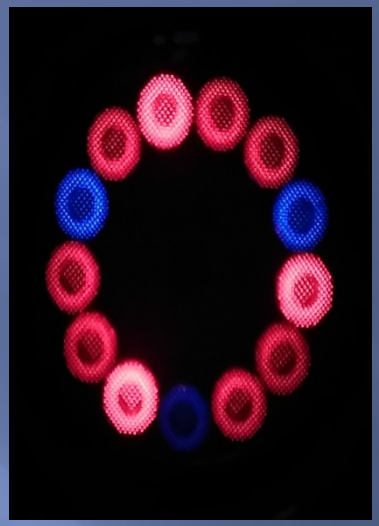
Red

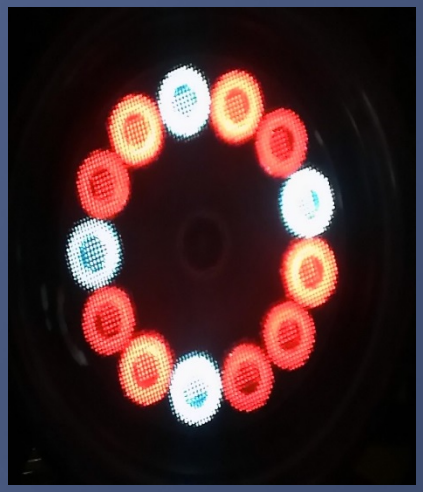


Blue

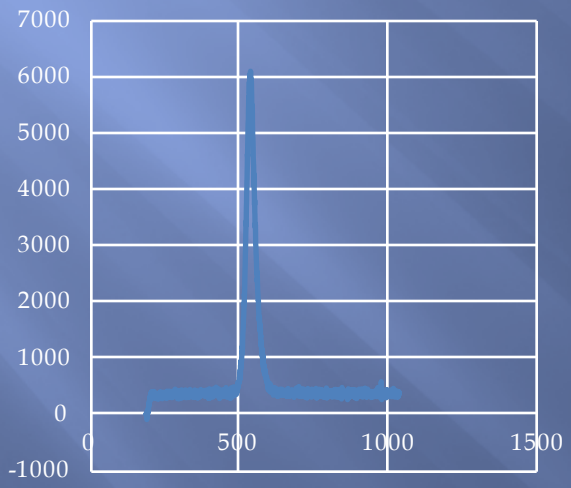




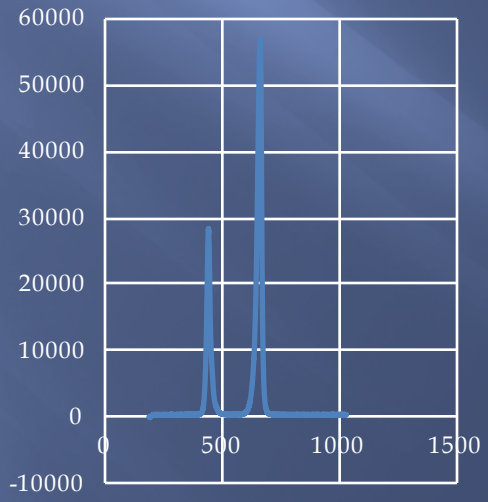




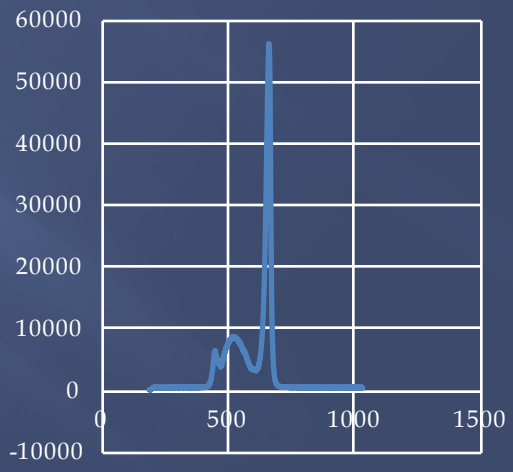
Green



Red/Blue

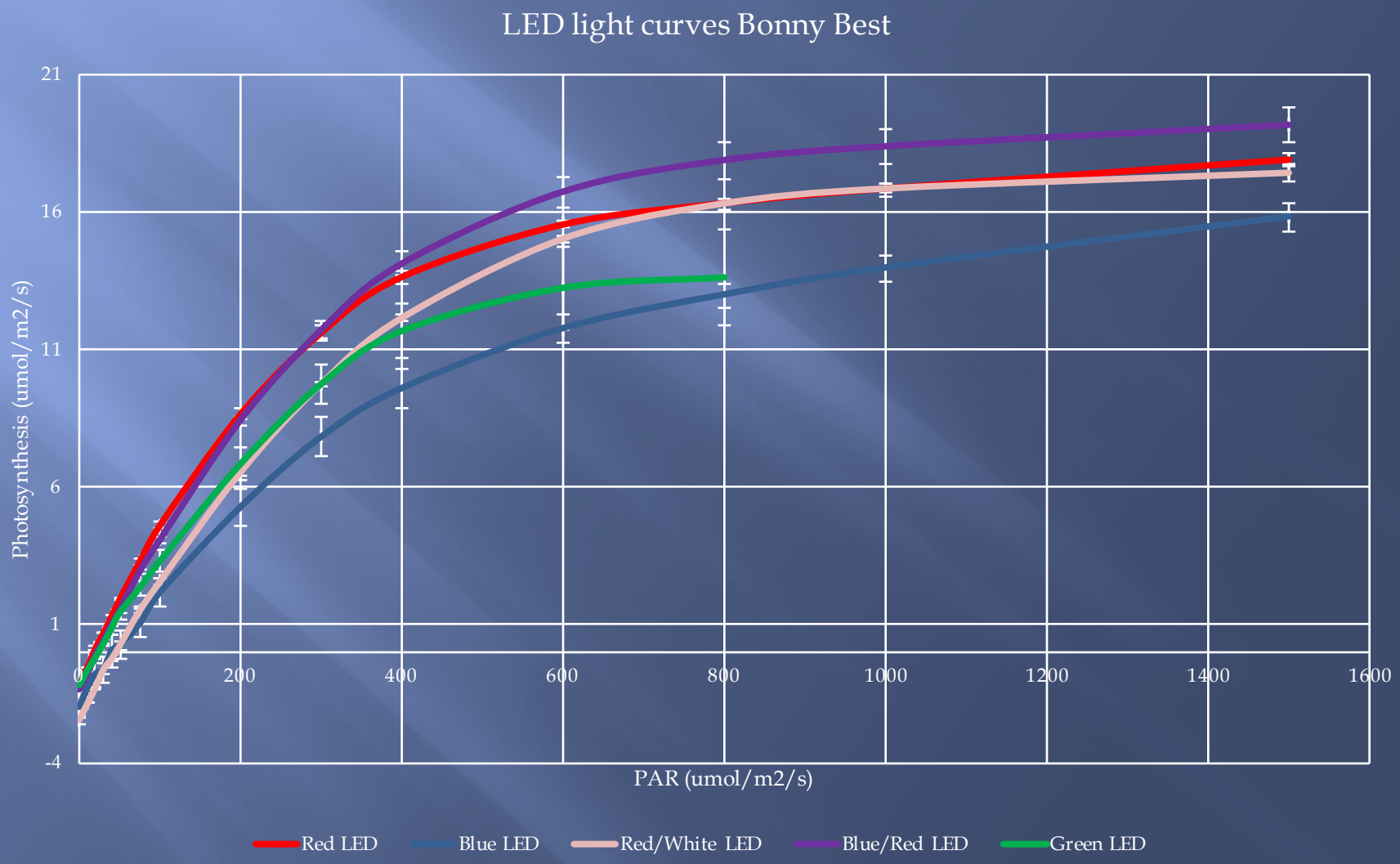


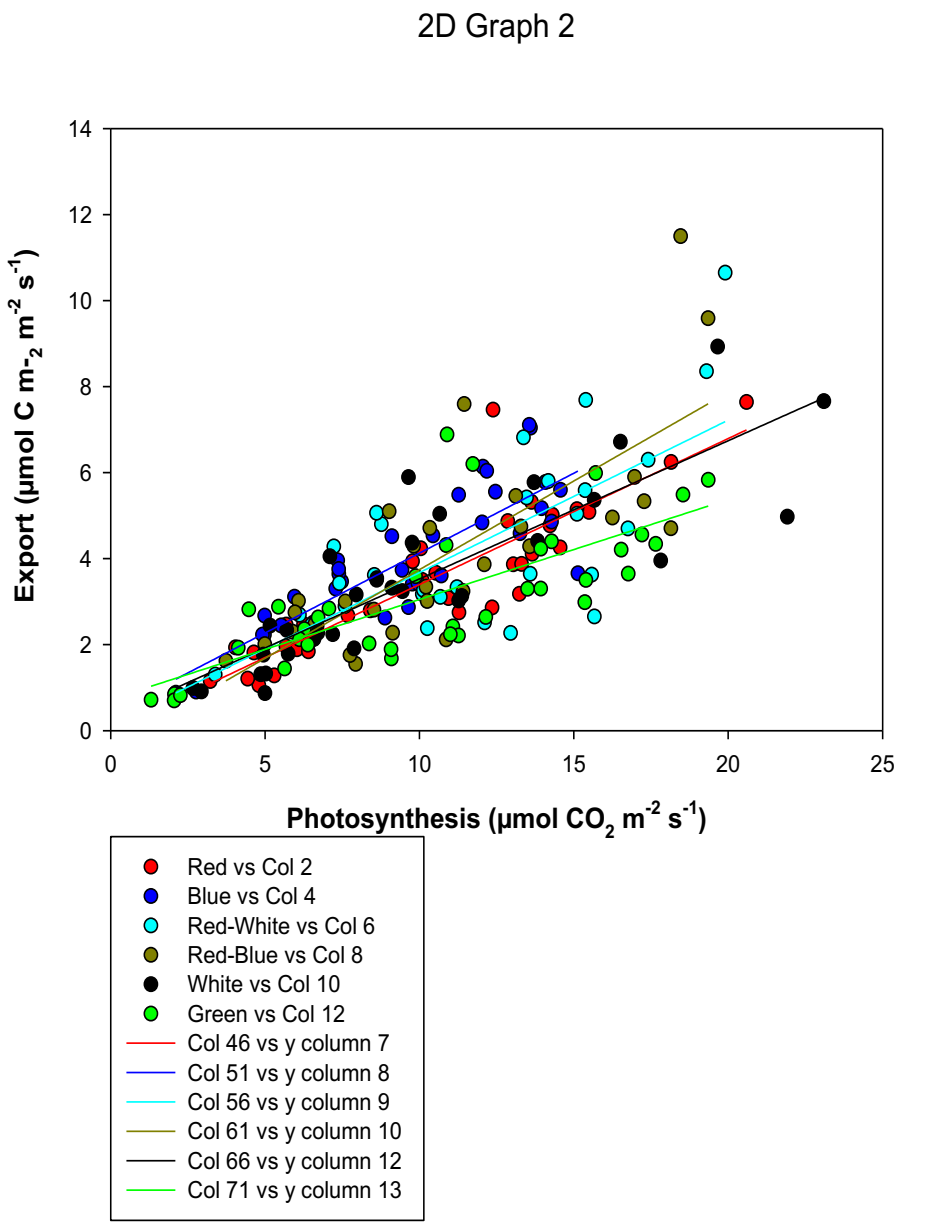
Red/White

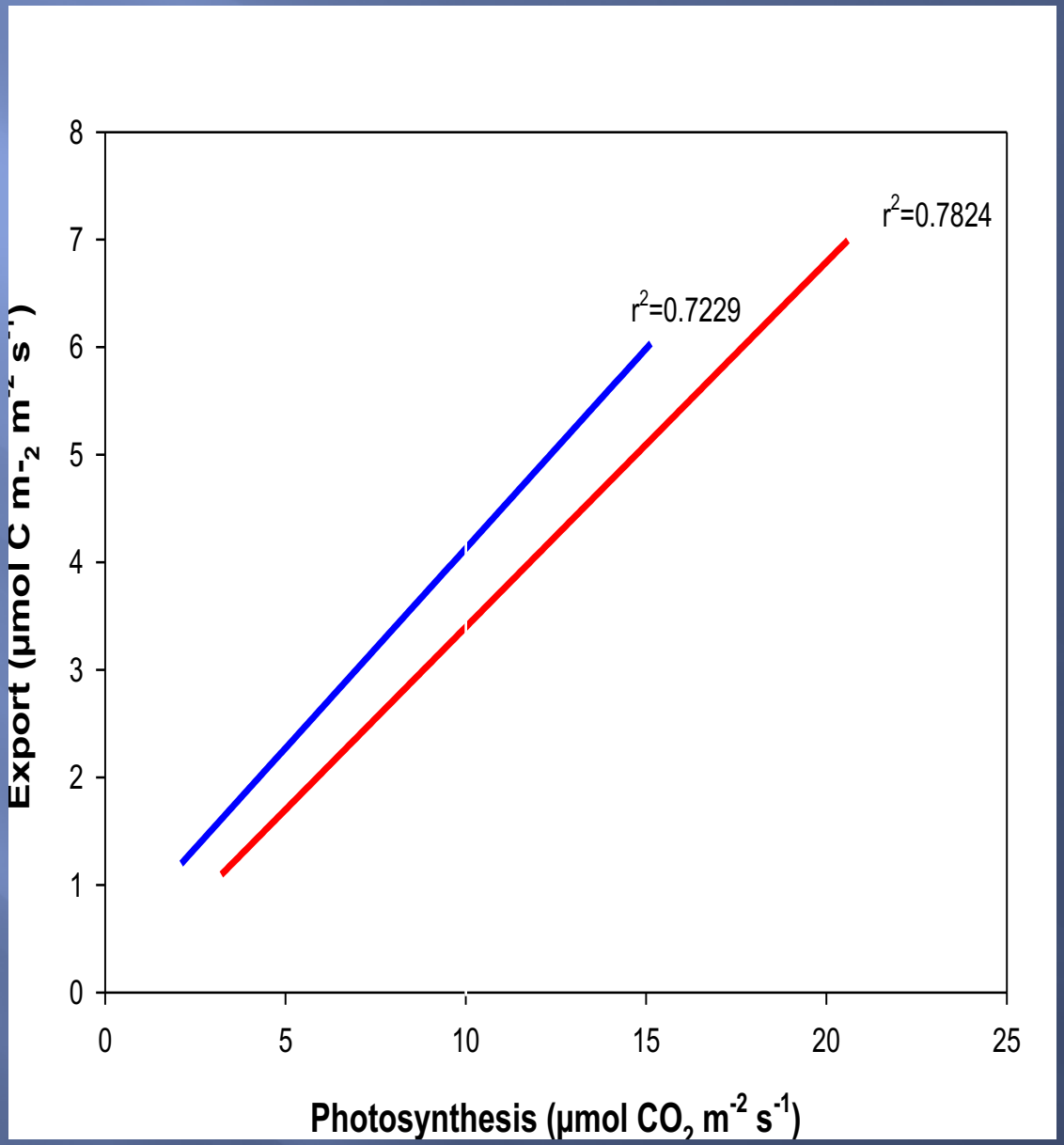


Export

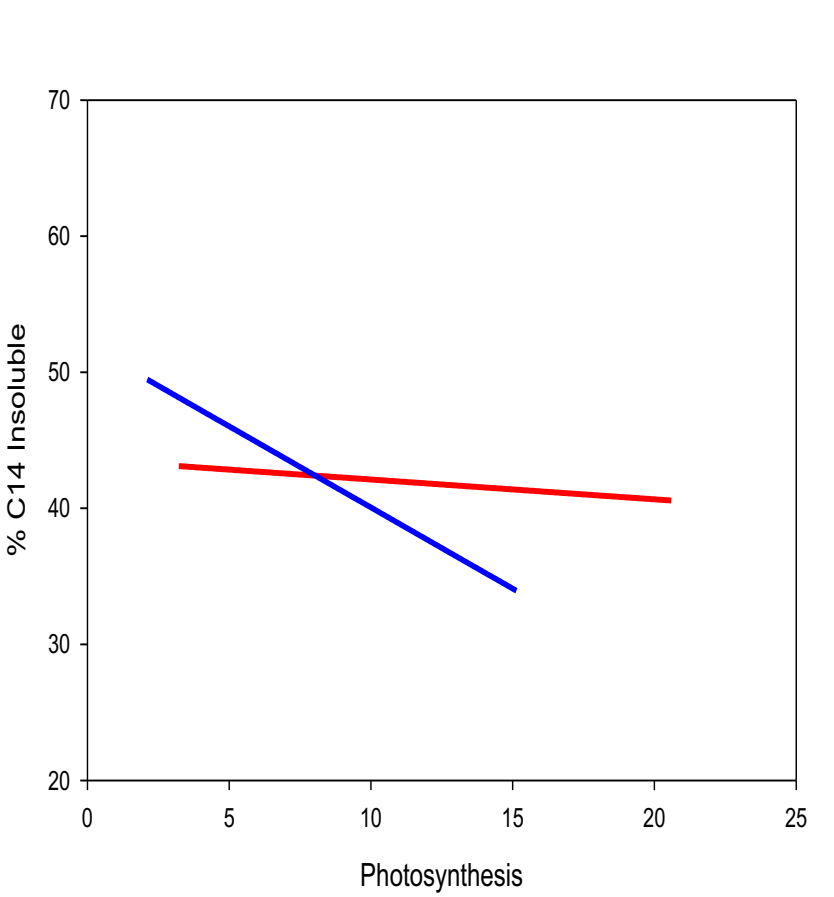
Leaf Photosynthetic Data

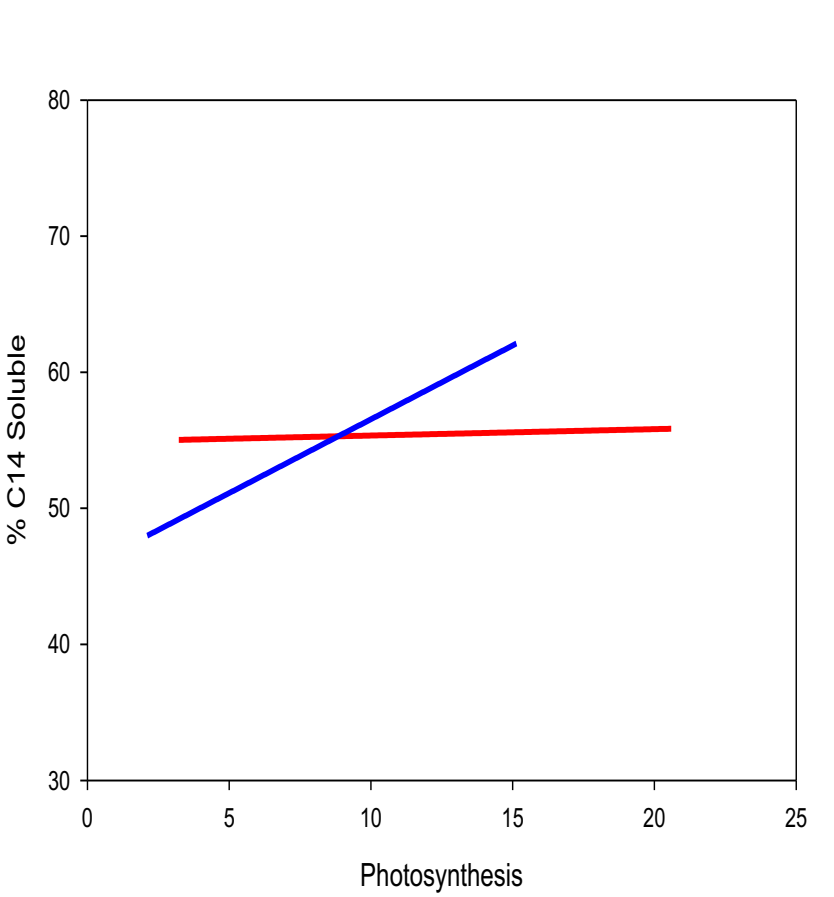



2D Graph 2
Export (µmol C m-2 m-2 s-1)
Photosynthesis (µmol CO2 m-2 s-1)
0
2
4
6
8
10
12
14
0
5
10
15
20
25
Red vs Col 2
Blue vs Col 4
Red-White vs Col 6
Red-Blue vs Col 8
White vs Col 10
Green vs Col 12
Col 46 vs y column 7
Col 51 vs y column 8
Col 56 vs y column 9
Col 61 vs y column 10
Col 66 vs y column 12
Col 71 vs y column 13


Export (µmol C m-2 m-2 s-1)
Photosynthesis (µmol CO2 m-2 s-1)
r2=0.7824
r2=0.7229
0
1
2
3
4
5
6
7
8
0
5
10
15
20
25

Carbon Partitioning ?





2017 Plans for Chrysanthemum

- Leaf light curves (CO_2 and Temp)
- Complete for whole plant studies under LD and SD
- Compare NCERs and Yield of the Burford and Guelph-grown-crops
- Determine daily export rates/patterns and link with RGR under different lights