INVESTIGATION OF THE IMPACTS OF TROPOSPHERIC OZONE ON MUNG BEAN IN PERADENIYA, SRI LANKA USING EDU

Anoma Perera & Shivanthi Wijesooriya
Department of Botany
University of Peradeniya
Peradeniya
Sri Lanka

Objective

- To estimate the impacts of tropospheric ozone pollution on Mung bean (*Vigna radiata*) in Sri Lanka

Materials and Methods

- Study site: premises of the faculty of Science, University of Peradeniya in the Central province of Sri Lanka
- Initial plan: to conduct the experiment two times at the same place
  - Season 1 – during the major wet season
  - Season 2 – during the dry period
- Experimental Protocol for quantifying the impact of tropospheric ozone on crops using protective chemicals

Season 1 – from November 2007 to February 2008

44 plots

(22 EDU Treated

& 22 not treated

with EDU) in

Complete

Randomized

Design

Ozone injuries (+ ozone injuries; - no ozone injuries)

Age of plants (Days)	EDU Treated (*n*=19)	No EDU (*n*=20)
7	-	-
17	-	-
27	-	-
37	-	-
47	-	-
57	-	-

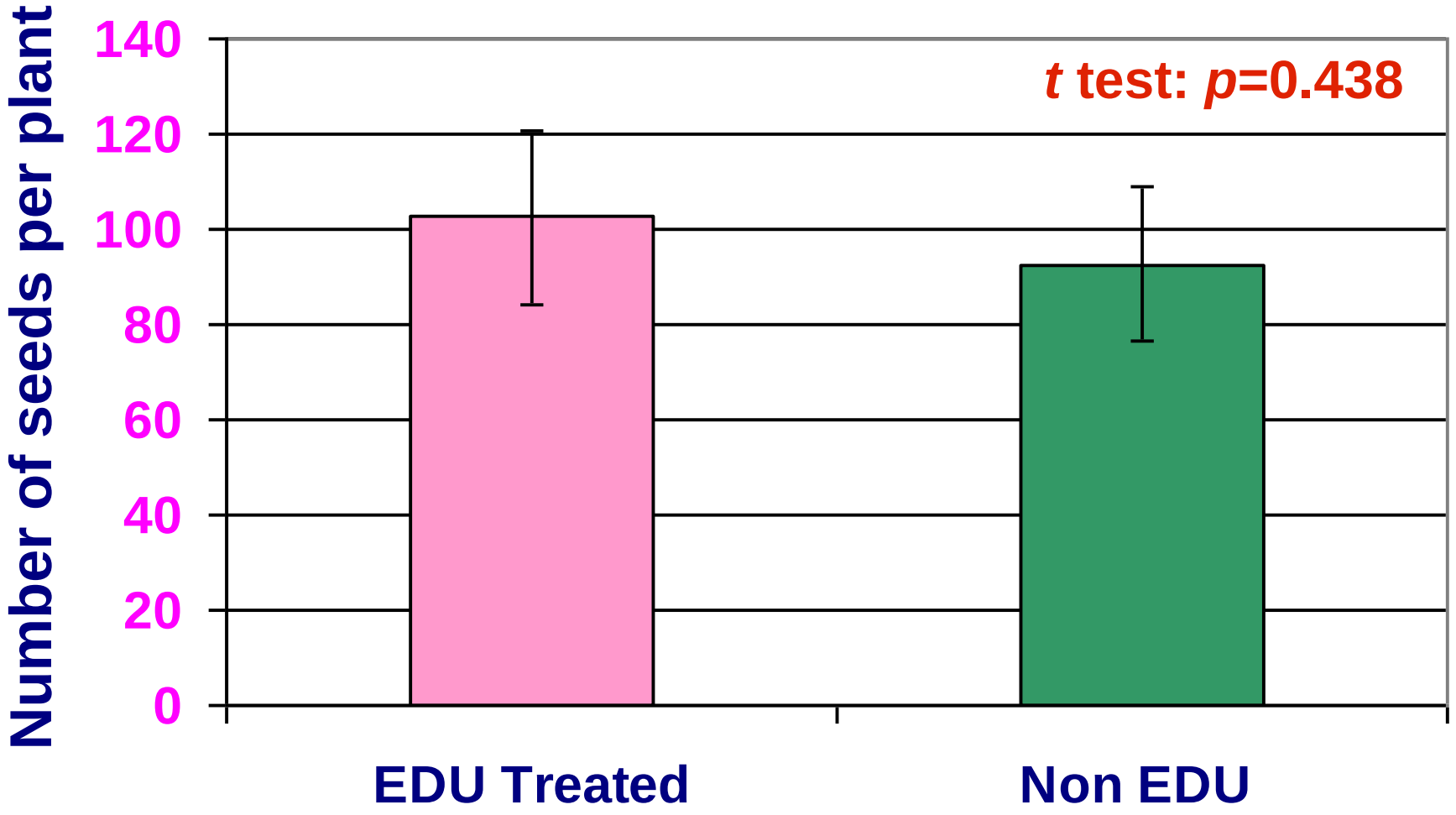
No ozone leaf injuries

Final harvesting

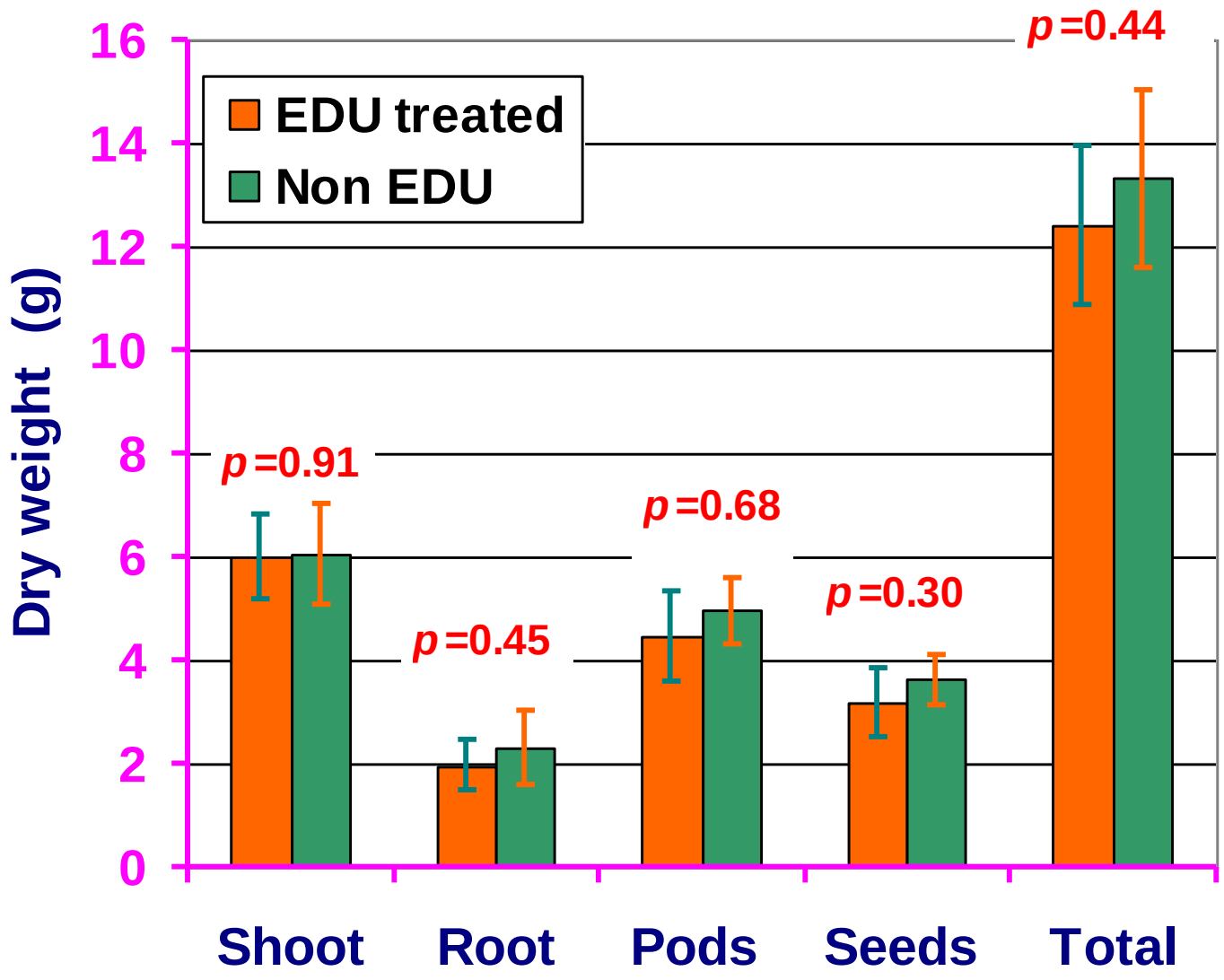
- 62 days after germination

  (Experiment started on 14th November, 2007 and final harvesting was done on 15th January, 2008)

Average Number of seeds per plant

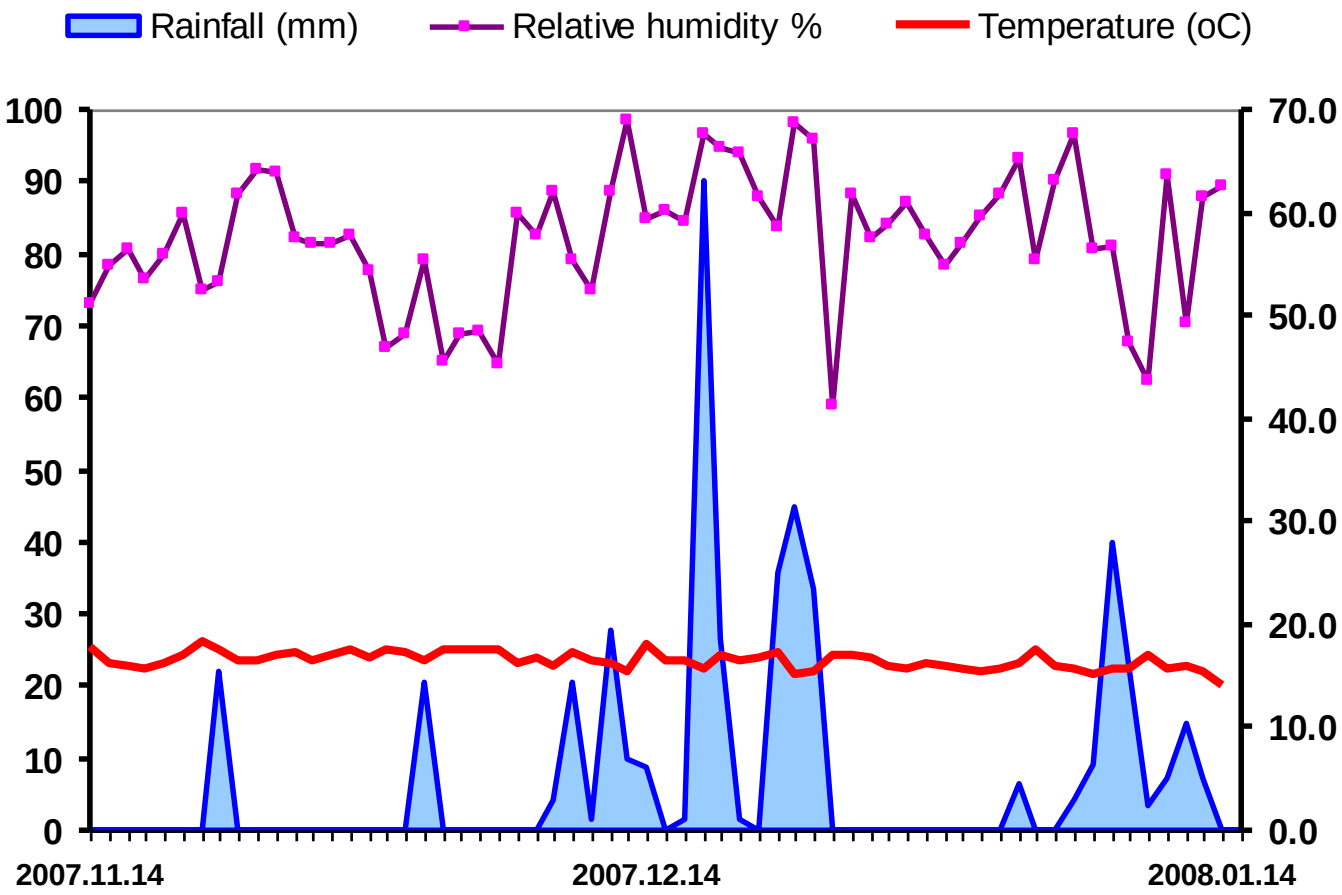


Biomass


EDU treated
Non EDU
Dry weight (g)
16
14
12
10
8
6
4
2
0
p =0.91
p =0.45
p =0.68
p =0.30
p =0.44
Shoot
Root
Pods
Seeds
Total

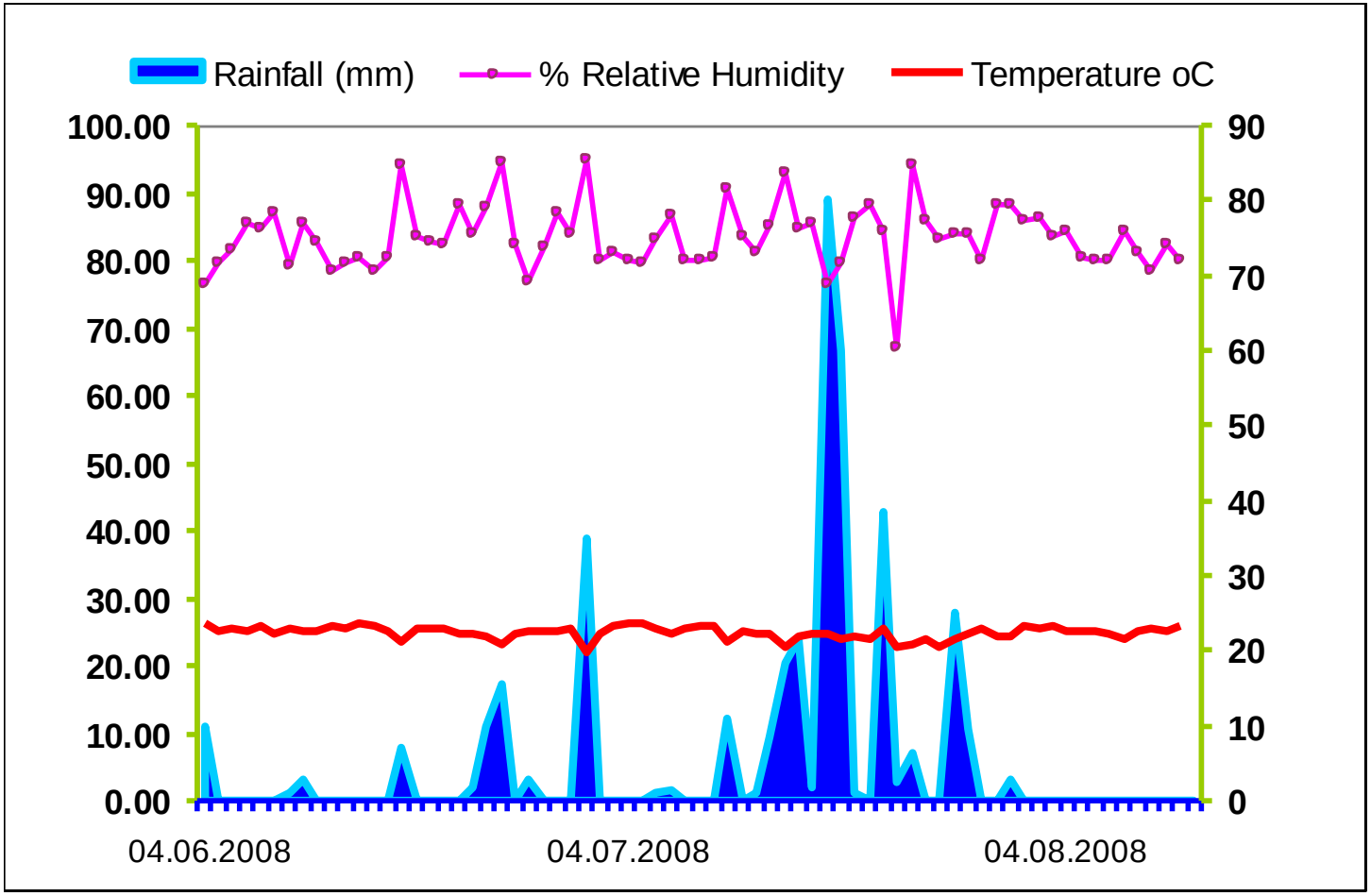
Ozone concentration

Passive sampler exposure period/growth period	Ozone concentration (ppb)	Average temperature (° C)
Week 1 to 4	20.5	24
Week 5 to 8	13.3	23
Week 9 to 12	21.3	25


Rainfall (mm)
Relative humidity %
Temperature (oC)
100
90
80
70
60
50
40
30
20
10
0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
2007.11.14
2007.12.14
2008.01.14

Season 2 – from June-August, 2008

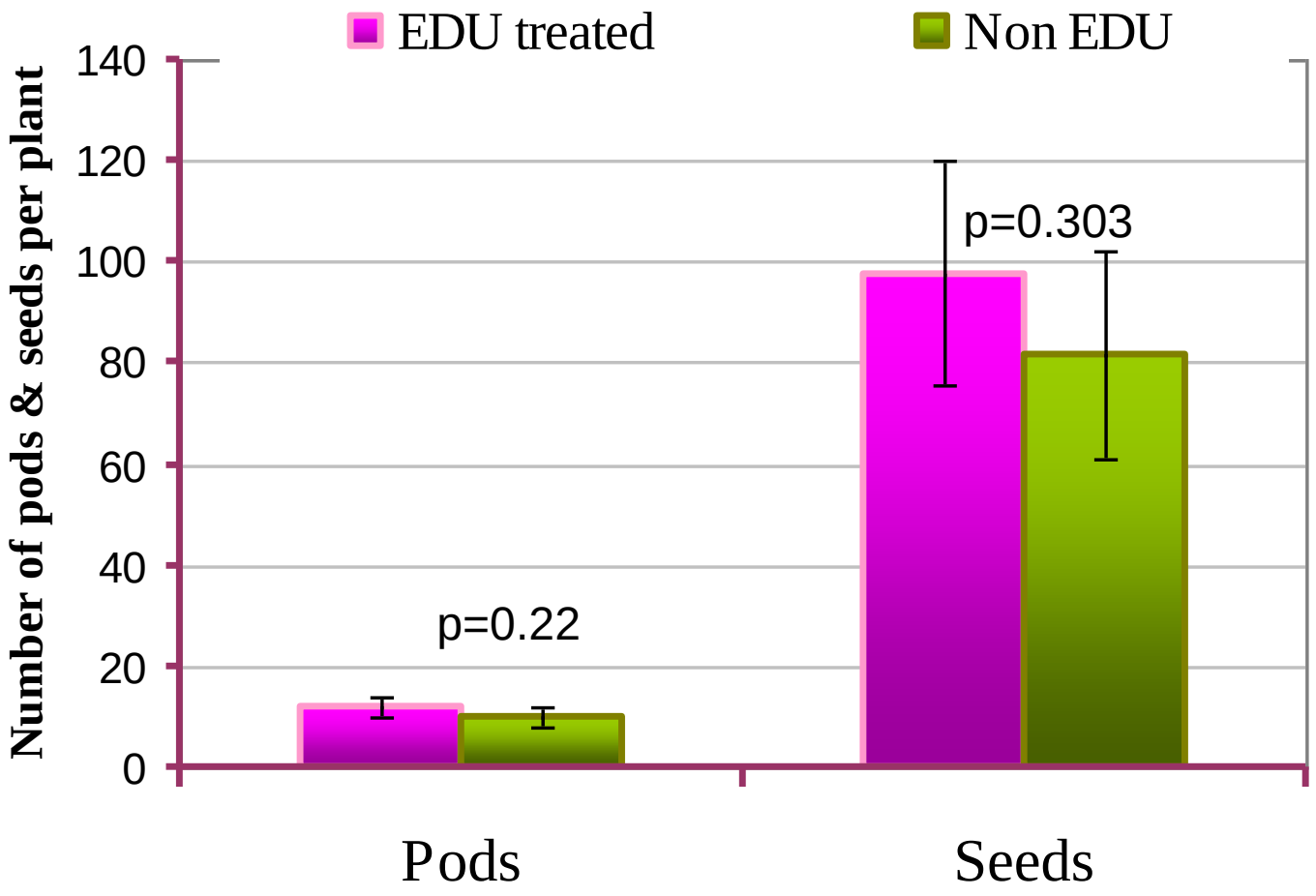
- Local mung variety
- Many precautions to control pest attacks
- 44 seedlings in CRD
- photo

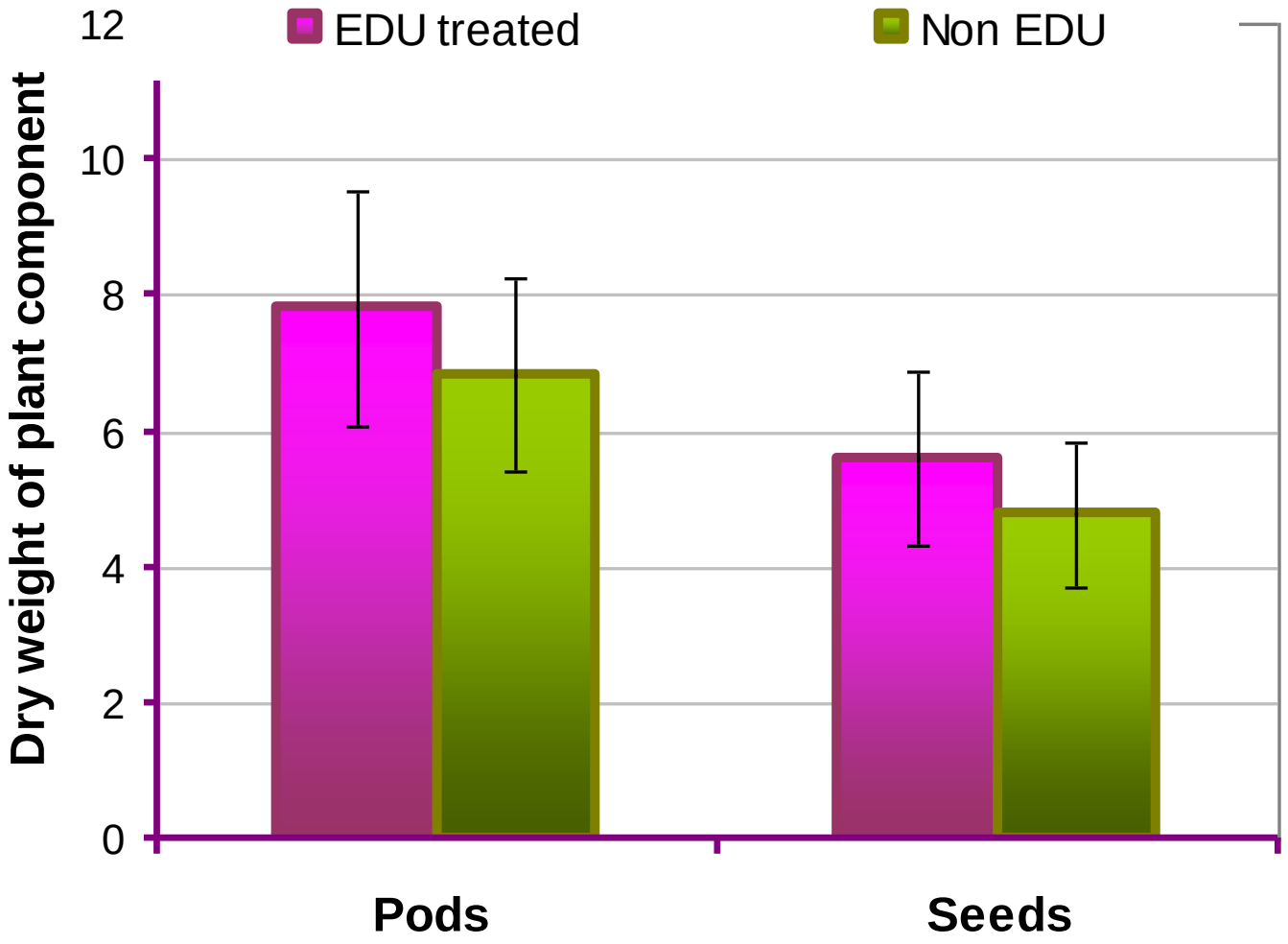

Rainfall (mm)
% Relative Humidity
Temperature oC
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
90
80
70
60
50
40
30
20
10
0
04.06.2008
04.07.2008
04.08.2008

- Ozone concentration

Time of EDU application	Age of plant (DAG*)	Concentration (ppm)	Volume added per plant (ml)
2008.06.12	7	400	100
2008.06.22	17	400	100
2008.07.02	27	400	150
2008.07.12	37	400	150
2008.07.22	47	400	200
2008.08.01	57	400	200

*Days after germination


EDU treated
Non EDU
Number of pods & seeds per plant
140
120
100
80
60
40
20
0
p=0.22
p=0.303
Pods
Seeds


EDU treated
Non EDU
Dry weight of plant component
12
10
8
6
4
2
0
Pods
Seeds

- Shoot biomass

- Chlorophyll content

Conclusions

- Not completed
- Average Ozone concentration at the study site is not at a risk level but there could be some high ozone concentrations which might created an impact on plants.
  - heavy rainfall, high humidity and lower night temperatures, changing weather patterns in the site during the study periods which may dilute the ozone impacts in Mung bean plants