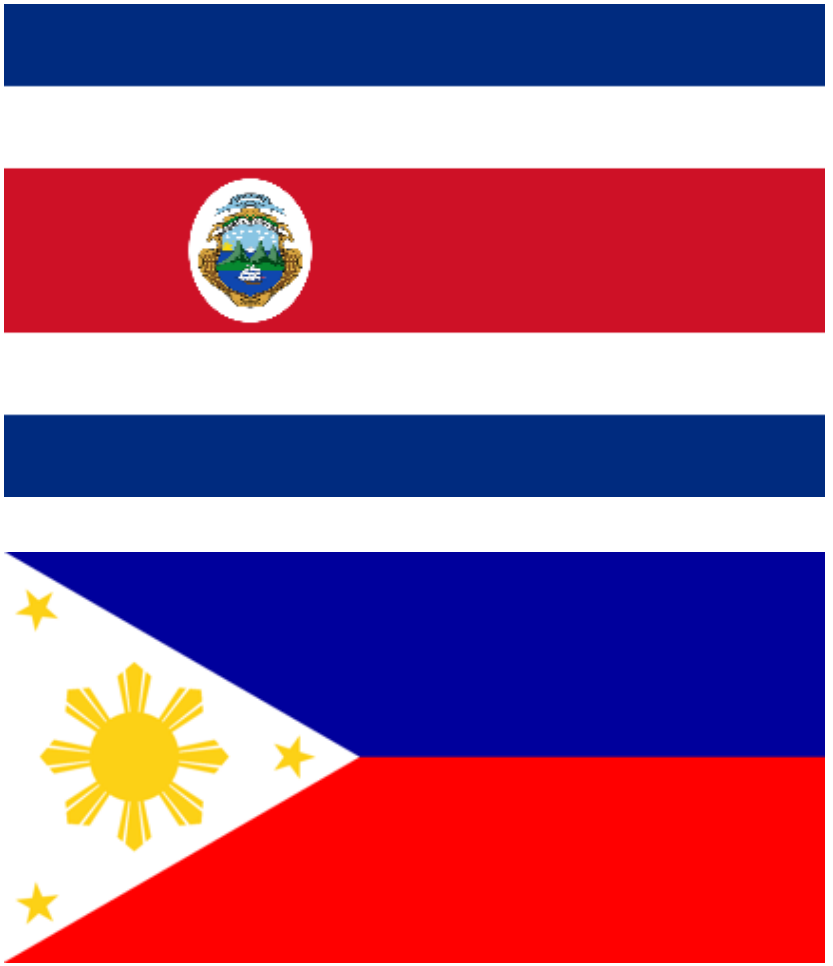
My International Research Experience

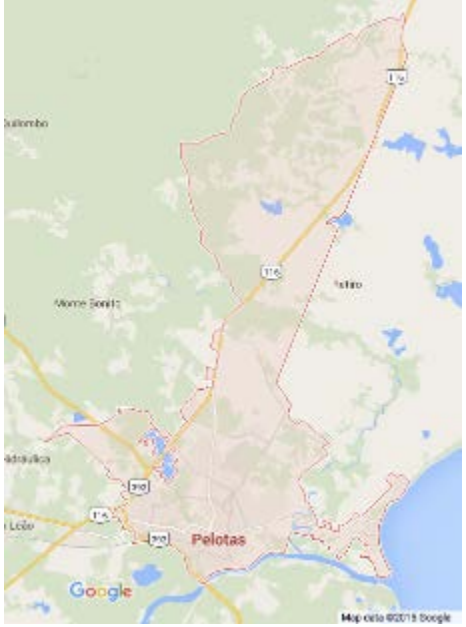
Dylan Milholen
Environmental, Soil & Water Science
Foundations of Sustainability
CSES Student Ambassador

Why Brazil, why UFPel?

- Brazil, Costa Rica, Philippines



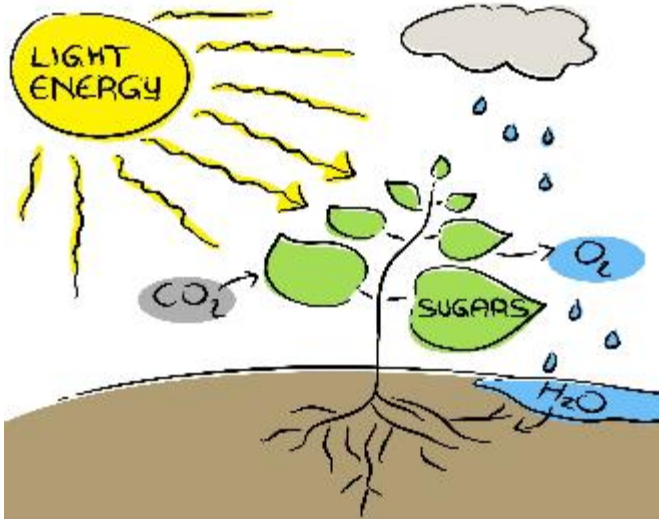
Brazil ~ RS ~ Pelotas



Pelotas ~ UFPel

Pre-trip objectives:

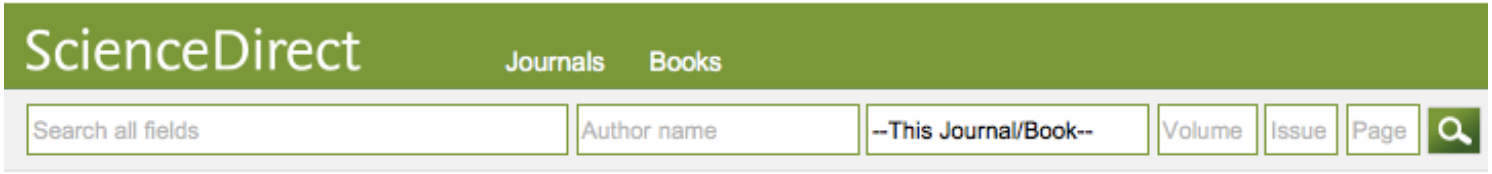
- to gain understanding of agricultural environments,
- explore biochemical properties in plants and their associated inputs,
- adapt to new surroundings while developing effective communication skills,
- to enjoy my summer with scholarly stimulation in a foreign location.



Time spent…

- Sample preparations

- Reading & researching on theory and applications of analytical instrumentation



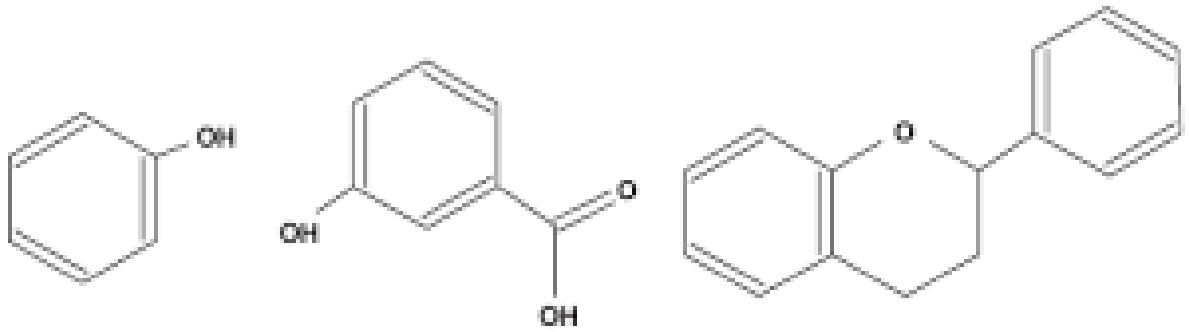
- Helping graduate students

Time spent...

Time spent...

My project

- “Measuring bioactive compounds and antioxidant activity of *Butia*”



Structures of common phenolic compounds.

Fig.1: archive.lib.cmu.ac.th

Butia

Fig. 2. -(Hoffman et al., 2014)- (a) Butia odorata and (b) basket (made from leaves), fruit, and liquor of Butia yatay (Photos by R.L. Barbieri).

Big questions

- Why focus on Butia?
- Why measure bioactive compounds and antioxidant activity?
- How is Butia, its bioactive compounds and antioxidant activity, analyzed?

Why focus on Butia?

- “Two decades ago, at the first Earth Summit, the vast majority of the world’s nations declared that human actions were dismantling the Earth’s ecosystems, eliminating genes, species and biological traits at an alarming rate”(Cardinale, B.J. et al. 2012).

Cardinale, B.J. et al. (2012) Biodiversity loss and its impact on humanity. Nature 486, 59–67

Why focus on Butia?

- Unfortunately the genus is endangered and at a risk of extinction due to expansion of urban areas, agricultural activities replacing the natural palm groves, illegal removal and commercialization of plants, reforestation with other tree species, and limited natural regeneration due to cattle grazing (Mistura, 2013; Nazareno and Reis, 2014a; Soares and Witeck, 2009).

Mistura, C.C., (Ph.D. thesis—Graduate Program in Agronomy) 2013. Characterization of genetic resources of Butia odorata in Pampa Biome. 80f. Universidade Federal de Pelotas, Pelotas, RS, Brazil.

Nazareno, A.G., Reis, M.S., 2012. Linking phenology to mating system: exploring the reproductive biology of the threatened palm species Butia eriospatha. J. Hered. 103, 842–852.

Soares, K., Witeck, L., 2009. Ocorrência de Butia capitata e outras espécies do gênero Butia na região central do Rio Grande do Sul, Brasil. In: Geymonat, G., Rocha, N. (Eds.), Butia: Ecossistema Único em el Mundo. Casa Ambiental, Castillos, Rocha, Uruguay, pp. 37–41.

Why focus on Butia?

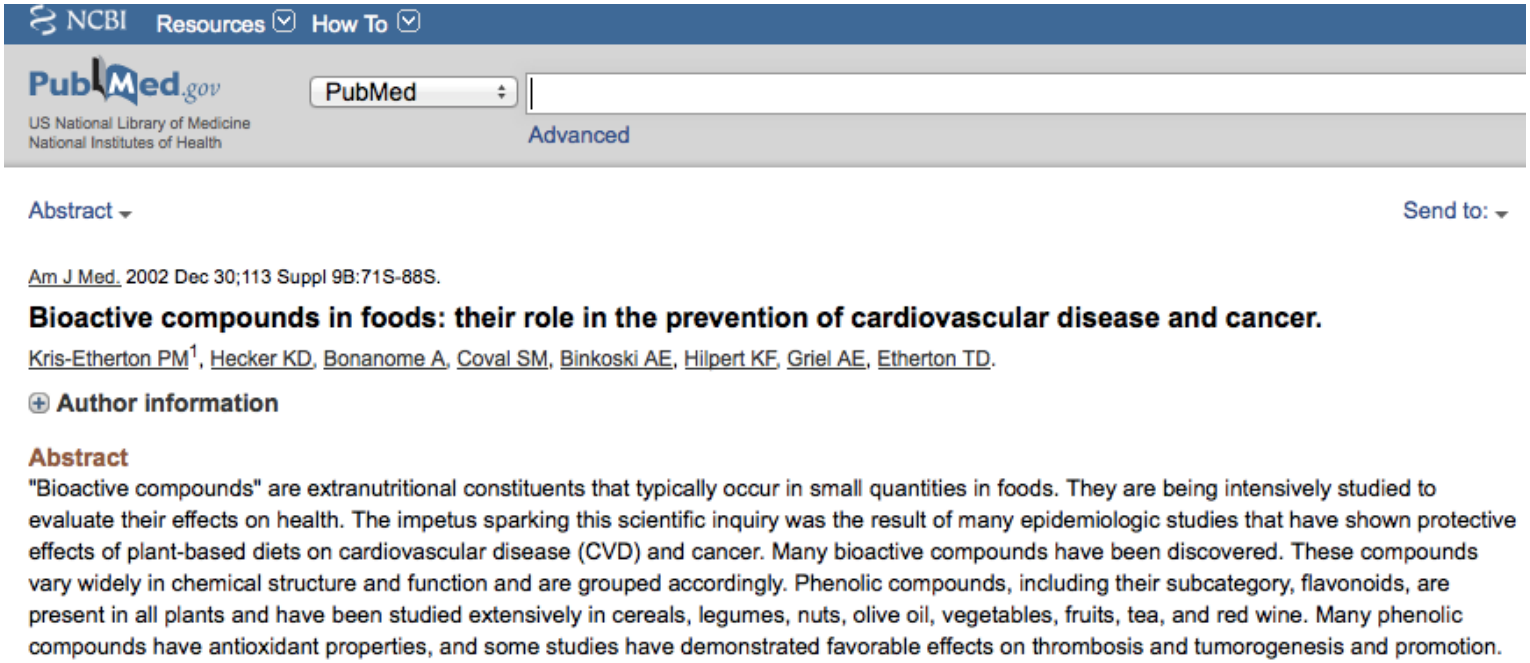
- Butia is typically harvested from wild or naturally occurring populations, with no existing commercial orchards (Hoffman et al., 2014).

-(Hoffman et al., 2014)- Illustrative representation of Butia spp. occurrence in South America (Adapted from Google maps).

Big questions

- ✓Why focus on Butia?
- Why measure bioactive compounds and antioxidant activity?
- How is Butia, its bioactive compounds and antioxidant activity, analyzed?

Why measure bioactive compounds and antioxidant activity?



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Abstract

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Am J Med. 2002 Dec 30;113 Suppl 9B:71S-88S.

Bioactive compounds in foods: their role in the prevention of cardiovascular disease and cancer.

Kris-Etherton PM[1], Hecker KD, Bonanome A, Coval SM, Binkoski AE, Hilpert KF, Griel AE, Etherton TD.

Author information

Abstract

"Bioactive compounds" are extranutritional constituents that typically occur in small quantities in foods. They are being intensively studied to evaluate their effects on health. The impetus sparking this scientific inquiry was the result of many epidemiologic studies that have shown protective effects of plant-based diets on cardiovascular disease (CVD) and cancer. Many bioactive compounds have been discovered. These compounds vary widely in chemical structure and function and are grouped accordingly. Phenolic compounds, including their subcategory, flavonoids, are present in all plants and have been studied extensively in cereals, legumes, nuts, olive oil, vegetables, fruits, tea, and red wine. Many phenolic compounds have antioxidant properties, and some studies have demonstrated favorable effects on thrombosis and tumorogenesis and promotion.

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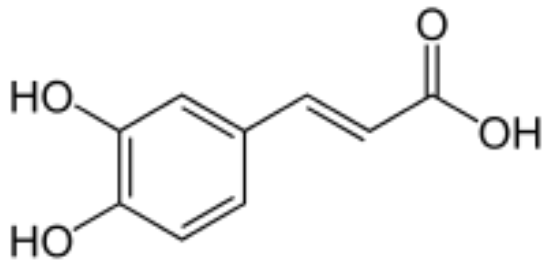
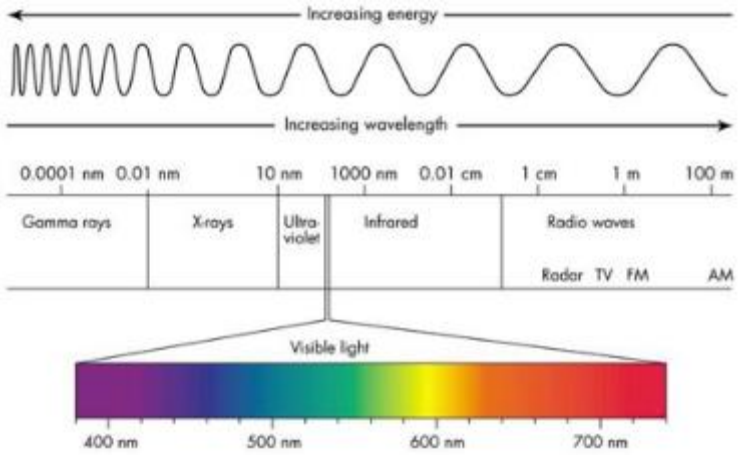
Big questions

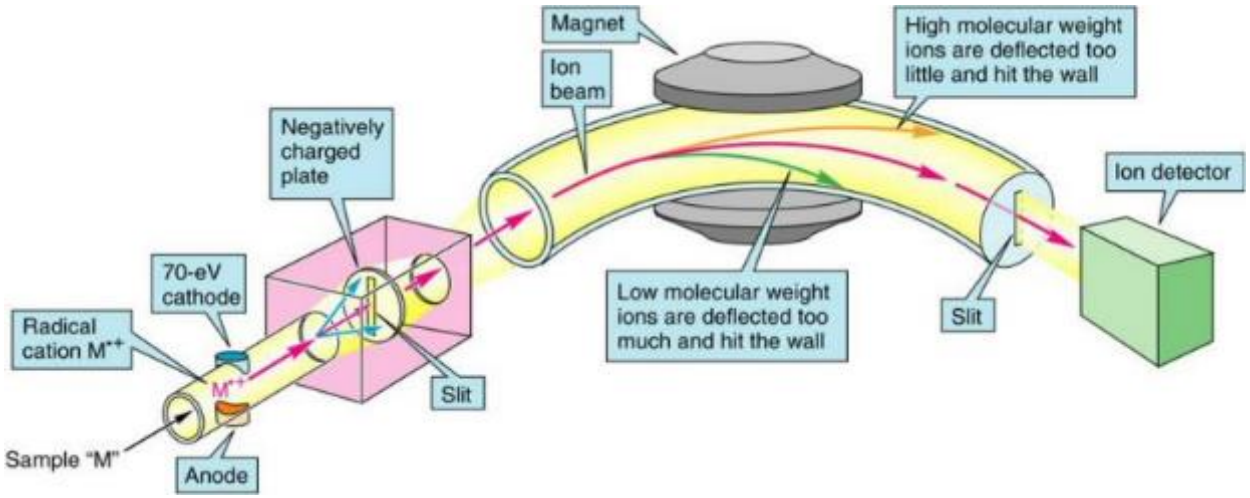
- ✓Why focus on Butia?
- ✓Why measure bioactive compounds and antioxidant activity?
- How is Butia, its bioactive compounds and antioxidant activity, analyzed?



How is Butia, its bioactive compounds and antioxidant activity, analyzed?

- UV-VIS Spectrophotometry
- HPLC
- Mass Spectrometry





UV-VIS Spectrophotometer

HPLC

Mass Spectrometry

How is Butia, its bioactive compounds and antioxidant activity, analyzed?

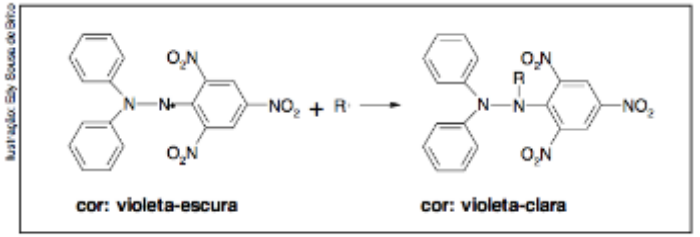


Fig. 1. Estabilização do radical livre DPPH.

Comunicado 128
Técnico
on line
ISSN 1679-6535
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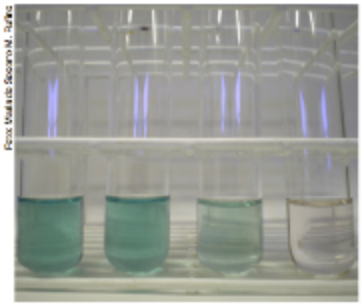

Metodologia Científica: Determinação da Atividade Antioxidante Total em Frutas pela Captura do Radical Livre ABTS$^{\bullet+}$

Maria do Socorro Moura Rufino[1]
Ricardo Elesbão Alves[2]
Edy Sousa de Brito[3]
Selene Maia de Morais[4]
Caroline de Goes Sampaio[5]
Jara Pérez-Jiménez[6]
Fulgencio Diego Saura-Calixto[7]

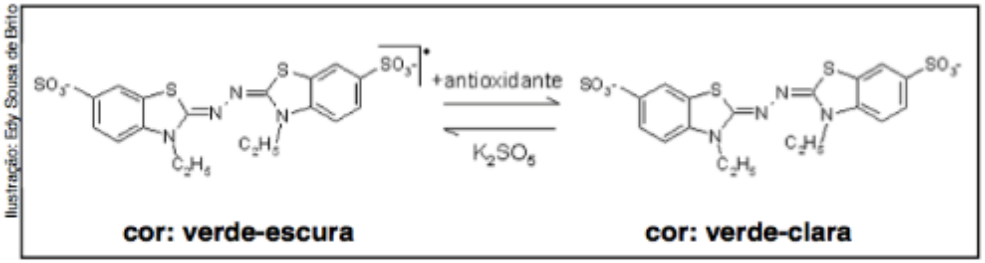

Fig. 1. Estabilização do radical ABTS$^{\bullet+}$ por um antioxidante e sua formação pelo persulfato de potássio.

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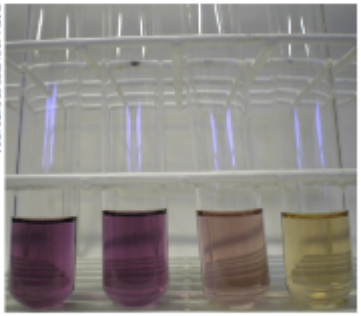

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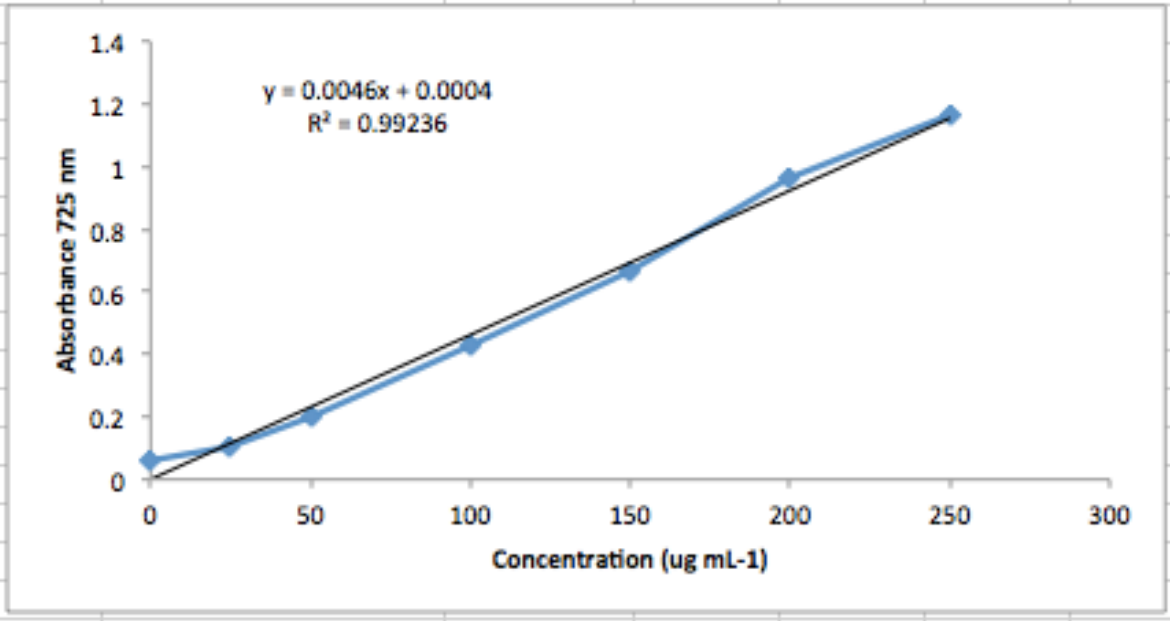
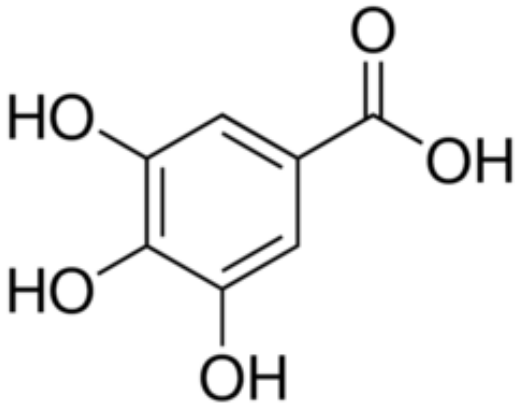
How is Butia, its bioactive compounds and antioxidant activity, analyzed?

Gallic acid	
Concentration (ug mL)	Absorbance
0	0.06
25	0.1085
50	0.198
100	0.425
150	0.661
200	0.961
250	1.1635





Results

- Coming soon

Revisiting Pre-trip objectives:

- ✓ to gain understanding of agricultural environments,
- ✓ explore biochemical properties in plants and their associated inputs,
- ✓ adapt to new surroundings while developing effective communication skills,
- ✓ to enjoy my summer with scholarly stimulation in a foreign location.

ACKNOWLEDGMENT

- Funding for this activity was provided by the CAFLS Study Abroad Program – International Education

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  - UFPEL – Dr. Fabio Chavez
  - U of A
    - Dr. Richard Esten Mason
    - Dr. Nilda Roma-Burgos